

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 21 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

The Evacuation Warden will be responsible for shelter-in-place or evacuation of the people under their jurisdiction (including outside personnel). All Evacuation Wardens shall be responsible for assuring that head counts are taken on site and at assigned rally points.

#### Personnel Accounting (Head Count)

Personnel shall be accounted for and reports sent verbally to Head Count Coordinator (designated by the Incident Commander) by radio on channel 2 "Shipping channel". Head counts may be made by telephone if radio traffic is heavy. Dial 104 (Admin. Building) on days and 253 (Control Room) at other times.

To ensure that maintenance personnel who are working overtime are accounted for, the Incident Commander or his designee shall review the "Overtime Record" to ascertain if maintenance personnel are on site prior to declaring that all personnel are accounted for. The "Overtime Record" is provided to Operations each day.

**IMPORTANT:** It is everyone's responsibility, whether on site on schedule or on overtime, to ensure that they are included in the personnel accounting.

#### **SHELTER-IN-PLACE**

If the warning is given to SHELTER-IN-PLACE,

- 1) IF IN THE QC LAB OR OUTSIDE, GO TO THE MAINTENANCE SHOP, OR THE NEAREST CONTROL ROOM,
- 2) STAY IN THE BUILDING WHERE YOU ARE,
- 3) CLOSE ALL WINDOWS AND DOORS,
- 4) TURN OFF ALL FANS, AIR CONDITIONING AND HEATING UNITS,
- 5) SEAL OFF CRACKS WITH TAPE, DAMP RAGS OR TOWELS,
- 6) WAIT FOR FURTHER INSTRUCTIONS FROM THE INCIDENT COMMANDER.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 22 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**RALLY CENTERS****OFFSITE -**

- 1) West -- Across bridge -- Simpson's One Stop on LA 2.
- 2) East -- Union Hall parking lot on LA 2.
- 3) South -- NorAm Gas entrance (corner) on Keystone Road.

**PLANT EXITS -**

- 1) North Gate
  - 2) South Fence Emergency exits \*
  - 3) West Fence Emergency exits \*
  - 4) North-West Fence Emergency Exit \*
  - 5) North Parking Lot \*
- \* Keys for locks are in Yellow Boxes

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 23 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

## SEVERE STORM - TORNADO PREPAREDNESS

A weather alert radio is maintained at all times at the NP control room. If a "tornado warning" \* is broadcast for the immediate area, the Incident Command System will be initiated. The Incident Commander will make the decision to:

- 1) Sound the Alarm
- 2) Notify or contact this list:
  - E. L. Green
  - R. L. James
  - P. F. Normand
  - K. E. Kay
  - J. W. Sutton

When the alarm is given,

- 1) Stop and secure all loading, unloading or transfer of product.
- 2) All personnel outside in operating areas should seek shelter in the respective control rooms.
- 3) In buildings, proceed to areas and take shelter as directed by the Incident Commander.
- 4) Area Supervision will make head count after alarm is sounded and after "all clear" is given.

All personnel taking shelter in buildings should seek the strongest part of the building, staying away from windows if at all possible. Unless otherwise designated, go to the center of the building near a strong wall.

\* Tornado warnings are issued after a confirmed sighting of an actual funnel cloud.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 24 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

## RESPONSIBILITIES

### **INCIDENT COMMANDER:**

Emergency Plan implementation will be under the direction of the Incident Commander who is responsible for the following:

- 1) Assessment of the possible hazards to human health or the environment and initiating action as necessary to minimize the exposure of plant personnel and the general public.
- 2) Immediate notification of the Responding Agency Official who may assume Incident Command responsibility, providing the following:
  - a) Name and telephone number;
  - b) Name and address of facility;
  - c) Time and type of incident (e.g., release, fire);
  - d) Name and quantity of material(s) involved, to the extent known.
  - e) Where to respond based on site and weather conditions
- 3) Notification of Sterlington site leaders.
- 4) Documentation of events/communications as they occur in the operating log.
- 5) Once emergency is over, secure the scene for purposes of accident investigation as appropriate.
- 6) Notifying the DEQ and appropriate State and Local authorities that the following actions have been completed before operations of the affected facility are resumed. (This notification must be made within 60 minutes of exceeding the RQ for the substance involved in the incident.)
  - a) Proper cleanup procedures have been completed of all waste that may be incompatible with the released material;



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 25 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- b) All emergency equipment is cleaned and fit for its intended use.

**SITE COMMANDER:**

- 1) Assesses the severity of the emergency and its overall impact on the unit and the plant.
- 2) Initiates appropriate action under the plan to promptly control the emergency, maintaining communication with the Incident Commander and other response team members.
- 3) Determines that appropriate personal protective equipment, including but not limited to SCBA, is worn by all responding personnel.
- 4) Directs fire fighting and rescue operations in coordination with the Ouachita Parish Fire Department and the Safety Officer.
- 5) Directs Shutdown of the Plant, either controlled or emergency as required or directed by the Incident Commander.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 26 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**SAFETY OFFICER:**

- 1) Knowledgeable in the operations being implemented at the site.
- 2) Identifies and evaluates hazards.
- 3) Provides direction with respect to the safety of operations for the emergency at hand.
- 4) Provides direction to the Site and Incident Commander to assure that appropriate personal protective equipment is worn by responding personnel, including monitoring for the presence of hazardous materials.
- 5) Assumes authority to alter, suspend or terminate activities if an IDLH or imminent danger condition develops.  
IDLH or Immediately Dangerous to Life or Health is an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.
- 6) Immediately informs the Site Commander and the Incident Commander of any actions needed to correct those hazards at the scene.
- 7) Develops and monitors decontamination procedures used at the site.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 27 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**LIAISON OFFICER:**

The Liaison Officer is responsible for:

- 1) Meeting responding agencies
- 2) Coordination and communication of information request from agencies
- 3) Establishing communications between agencies and the Incident Commander.
- 4) Assisting the Incident Commander as needed with other duties.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 28 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**ENVIRONMENTAL OFFICER:**

The Environmental Officer is responsible for:

- 1) Implementing the Dow internal EH&S incident notification procedure.
- 2) Notifying Federal, State and local regulatory agencies as appropriate.
- 3) Coordinating air and water monitoring, and clean up activities in the plant and the surrounding community with local DEQ and Region VI EPA officials, and Incident Command.
- 4) Keeping the local ANGUS public relations contact and the Incident Commander informed of any adverse public relations as soon as they occur regarding any environmental situations caused by plant operations.
- 5) Report to the Incident Commander any visit by any regulatory enforcement officer that could result in an adverse report by a government agency.
- 6) Submitting a written report to the Ouachita Parish LEPC and the State Emergency Response Commission within five (5) days after the incident.
- 7) Submitting a written report to the DEQ, within fifteen (15) days after the incident.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 29 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

## GENERAL PROCEDURES

### RESPONDING AGENCIES

The Ouachita Parish Fire Department is the lead agency in all-hazardous material incidences.

The Ouachita Parish Fire Department is normally the first responder to the scene with the Senior officer the Incident Commander coordinating activities with the ANGUS Incident Commander. Command structure for responding agencies may change as conditions warrant.

The Ouachita Parish Fire Station #9 located at Fairbanks is approximately 7-10 minutes response time from the plant. All 911 calls regarding fires and medical emergencies will initially be routed to this station for response.

Area security and traffic control are the responsibility of the Ouachita Parish Sheriff's Department and the State Police as directed through Incident Command.

Incident Commander coordinates environmental concerns through the regional office of DEQ and EPA Regional VI.

Incident Commander coordinates response to terrorist activities through the Ouachita Parish Office of Homeland Security.

Plant Two-way Radios have been provided to the Ouachita Parish Fire Department to facilitate communication between ANGUS Incident Commander and the responding Fire Department unit. These radios shall be utilized to report conditions and direct fire department which direction to approach plant. These radios are subjected to a weekly radio check between the Ouachita Parish Fire Department and ANGUS front gate security.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 30 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

#### **FACILITY SECURITY**

1. A security fence surrounding the perimeter of the plant encloses the Sterlington facility. All access gate openings with the exception of the northwest and main gates are maintained in a locked position and vehicle barriers are in place. The main gate is manned by security guards when the gate is open. The west gate is controlled by shipping personnel, and is intended for transport traffic. All visitors and contractors are to enter the plant by way of the main gate.
2. All personnel (ANGUS employees) are provided photo ID badges. Access to the facility is restricted to only personnel with an ID badge. Visitors and short term contract personnel must always sign in/out with the security guard or the visitors' log, located in the reception area, depending on how they enter the facility.
3. In the event of an emergency, all nonessential access to the plant shall cease.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 31 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**DECONTAMINATION**

Procedures - Responsibility of, and monitored by the Safety Officer:

- 1) Plan developed and communicated to responders prior to site entry.
- 2) Monitors procedures to determine:
  - a) All responders leaving are appropriately decontaminated.
  - b) All clothing and equipment leaving are appropriately decontaminated.
  - c) Modifies procedures as required to maintain effectiveness.
- 3) Coordinates with Environmental Officer to prevent exposure of uncontaminated personnel and equipment, and containment to prevent run off contamination.
- 4) Coordinates disposal and/or cleanup contaminated clothing and equipment.
- 5) All employees transported off-site for medical assistance shall be decontaminated, and all contaminated clothing removed. All contaminated clothing shall remain on site. In the event the proper decontamination is not possible, the employee shall be washed down and wrapped in plastic, the receiving facility and ambulance personnel shall be notified that the employee is contaminated.

**Response Personnel & Equipment**Asbestos

Response Team Personnel may be exposed to insulation debris containing asbestos. Decontamination procedures include wash down of boots with water and brush which is placed in appropriate containers for disposal. Any contaminated clothing will be contained in plastic bags for cleaning or disposal as appropriate.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC # : SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 32 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

### **Chemicals/Hazardous Waste**

Response Team Personnel potentially exposed to any chemicals and/or hazardous waste will wash down boots and protective gear with detergent water. Wash solution is to be contained in appropriate containers or in a basin to prevent run off contamination. Wash down solution and rinse water will be evaluated for proper disposal method by the environmental department prior to release. Contaminated clothing will be removed and contained in plastic bags for cleaning or disposal as appropriate. Personnel will shower if skin contact has occurred.

### Major Chemicals Potential Exposure List

NP Stripper bottoms	Nitroparaffins
Basic NP's & Intermediates	Formaldehyde
NP Heads	Methanol
Chem Wash/Spent Chem Wash	Butanol
Nitric Acid	Ammonia
Sulfuric Acid	Amine Solutions
Sulfur Dioxide	Sodium Hydroxide
Methyl Chloroform	Trimethylamine

### General

Equipment will be transported to the curbed concrete wash pad at the north end of K-47. Facilities are available for water washing, chemical cleaning, and steam cleaning as required. Depending upon the nature of the contaminate, wash water will be contained for analysis prior to appropriate disposal.

Environmental Remediation Specialists will be brought in as required if more extensive decontamination procedures and facilities are required.

### **EMERGENCY RESPONSE PLAN REVIEW**

- 1) A review of the response plan is held annually for employees during regularly scheduled safety meetings.
- 2) Drills are held periodically to ensure that all personnel are familiar with the plan and their responsibilities.
- 3) All drills and incidents requiring execution of the plan will receive a post-incident analysis by a review team consisting



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 33 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

of the Responding personnel, and operations and maintenance supervision present during the drill or incident. Changes will be incorporated as may be appropriate and communicated to all employees, through regular monthly safety meetings.

- 4) Plant drills will be held at least semi-annually. Tabletop as well as full-scale drills may be conducted. Planning will normally include involvement of Ouachita Parish Civil Defense personnel trained in Hazmat Exercise Design.

#### **DRILLS**

Drills and exercises to test operability of the ANGUS emergency plan are held on a routine basis. All exercises shall consist of the following:

1. Pre-planning
2. Table-top exercise
3. Drill
4. Critique immediately following exercise.

Problems noted in effecting the plan shall be addressed through plan modification, additional training, and/or equipment additions.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 34 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**MANUAL REVIEW:**

Responsibility - Emergency Planning Committee, a subcommittee of the Safety Steering Committee. The Responsible Care Leader serves as chairman.

Reviewed - Annually, or more frequently as directed by the EH&S Department.

Revision Frequency - As required.

Approval - Reviewed by the Responsible Care Leader and approved by Facility Leaders.

Master Copy Location - Master document is resident on the Network computer system. File name: IQNT01\ANGUS\_SOP\SAR\SAF\EMPLN01.4 (01.4 represents file extension)

Copies - All copies listed in Section 2.0, Manual Distribution, are considered CONTROL DOCUMENTS and will be updated as revisions are made.

Additional copies of the manual, or sections of the manual, may be obtained from the master copy, but are for reference only, and not to be used for plan distribution.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 35 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**Manual Distribution**

With each update of the Emergency plan manual the following letter will be attached outlining changes and revision number of the manual. These changes will be distributed to each holder of the Emergency plan manual.

TO: Emergency Plan Manual Holders

FROM: Emergency Planning Committee

DATE:

SUBJECT: Emergency Plan Manual Changes

The pages detailed below contain an amended text, an upgraded date and issue reference.

The attached copies are replacement pages for the manuals in your area of responsibility. Please remove the replaced pages immediately and destroy them.

<u>SECTION NO.</u>	<u>PAGE NO.</u>	<u>ISSUE NO.</u>	<u>DATE</u>
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Please sign below and mail this form to ANGUS indicating the obsolete pages have been removed and replaced with the replacement pages indicated above. (We are required by regulation to document that we have made arrangements with local emergency responders. Thanks for returning this form and helping us in this regard.) Please mail to:

**ANGUS Chemical - Responsible Care Leader**

**P.O. Box 1325**

**Sterlington, LA 71280**

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

CHANGE NUMBER: \_\_\_\_\_ SENT OUT: \_\_\_\_/\_\_\_\_/\_\_\_\_

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 36 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

MANUAL #	LOCATION	RETURNED	DATE
1	EH&S Delivery Spec.		
2	Eng & Maint. Leader		
3	Environmental Comp Leader		
4	Command Center		
5	Laboratory		
6	Gate Guard		
7	NP Derivatives Control Room		
8	Production Leader		
9	NP Basics Control Room		
10	NP Crystals Control Room		
11	Powerhouse Control Room		
12	Sterlington Logistics		
13	Ouachita Parish LEPC		
14	Ouachita Parish Fire Dept.		
15	Ouachita Parish Sheriff Dept.		
16	Sterlington Police Dept.		
17	Sterlington Hospital		
18	Morehouse General Hospital		
19	Glenwood Reg. Med. Cntr.		
20	HCA North Monroe Hospital		

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 37 Approval: P.E. Normand
<b>Emergency Response Plan Manual</b>		

21 Koch Nitrogen

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22 E.A. Conway Hospital

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ANGUS	ANGUS CHEMICAL COMPANY	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 38 Approval: P.F. Normand
Emergency Response Plan Manual		

## EQUIPMENT

### EMERGENCY COMMUNICATIONS SYSTEM

#### A. In-Plant:

- 1) EMERGENCY ALARM SYSTEM - When activated, this system provides one of the following emergency alarm signals and is followed by an appropriate emergency announcement.

General Emergency	-	Attack Siren
Evacuation	-	Whoop Siren
All clear	-	Hi Lo Siren

System is tested each Tuesday at 12 o'clock noon.

- 2) PLANT TWO-WAY RADIO SYSTEM - Primary in-plant system when access to telephone is not available. Radio system is on a battery backup during power outages. If base station is out, radios in operations areas, NP and NPD have simplex capability (Simplex - radio communications continue with out use of the repeater.) Plant radio channel 1 (Maintenance channel) is designated for emergency response use during plant emergencies. Channel 2 is used for reporting head count.

#### B. External Communications:

##### 1) Telephone:

- a) Local, dial 9 for out-of-plant calls.
- b) Dial 9-1-area code for out of immediate telephone service area calls.

- 2) A single line telephone with direct access to South Central Bell's telephone lines is available in the NP Basic/NP Derivative Control Room Building (K-19). Its red hand set can identify this telephone. The telephone number for this telephone line is (318) 665-0201.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 39 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- 3) If Plant and/or Sterlington phone system is down, communication to the outside will be made via cellular telephones. Cellular telephones are located in the NP Basic/NP Derivatives control building and in the Utilities Operator's truck. These phones may be accessed by dialing 366-7592 or 366-7465 to ring the telephones. All communication shall be restricted to emergency control activity.
- 4) If cellular telephones are in their locked mode, they can be made operational by dialing the Unlocking Code listed in the table below.

Cellular Location	Telephone number	Unlocking Code
NPB/NPD Control Room Building (K-19)	366-7592	592
NPB/NPD Control Room Building (K-19)	366-7465	465

- 5) Cellular telephones located inside control rooms may need to be brought outdoors to gain signal access to the cellular network system. Both control room units are equipped with batteries that will permit approximately four hours of operation on a fully charged battery.
- 6) Direct radio communication with outside agencies can be made via emergency network radios in guard house and PHA conference room. These radios are intended for incident commander use. They are set to the Ouachita Parish Emergency Response Communication frequency. These radios are color coded green.
- 7) If the above discussed ANGUS communication equipment is out of service, destroyed or otherwise in operable, communication with outside agencies may be made via Sterlington Police.

C. Village Alarm System:  
(Channel 1 Receiver)

- 1) Voice and visual messages are provided to the Town Hall, A. L. Smith Elementary School, and Sterlington Clinic when a plant emergency alarm is sounded. The messages are for information and decision making purposes.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 40 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- 2) The community alert is activated when the plant alarm is implemented.

#### **FIRE PROTECTION**

- 1) Fire Protection - Fixed:
  - a) Water - Four million gallon tank (Tank G-1); and two, 2-million gallon settling basins filled from Ouachita River.
  - b) Underground piping system to hydrants, monitor nozzles and sprinkler systems located through the plant.
  - c) Water supplied by three 2500 GPM diesel driven pumps and three 1500 GPM electric driven pumps. One pump runs continuously (variable speed controlled) to maintain 125 PSI on the system. The pumps are located in Building K-3 on the Southwest corner of the plant, adjacent to the South River Water Settling Basin and K-6 adjacent to the North River Water Settling Basin.
  - d) CO<sub>2</sub> System in "Satellite Building" in NP Plant.
- 2) Fire Protection - Portable:

Extinguishers - located throughout the plant.
- 3) MSA self-contained breathing apparatus (positive pressure - pressure demand) are located throughout the plant.
- 4) Ouachita Parish Fire Department

Ouachita Parish Fire Department responds to all requests for emergency assistance. They function through Incident Command and coordinate fire fighting and rescue efforts with the Site Incident Commander.



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 41 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**PERSONAL Protective Equipment**  
**CHEMICAL ENTRY SUIT**

Responder Level "A" Chemical Entry Suits for gas-tight protection when worn over a positive pressure self contained breathing apparatus are available in the following locations:

Location	Number	Area
NP Control	4	Control Room
Safety Dept.	4	Fire House
Powerhouse	2	NE Corner of Powerhouse
Shipping	2	Shipping Office
Administration	2	Electrical Center

LEVEL A (to be worn when the highest level of respiratory, skin, and eye protection is needed)

- A. Pressure-demand, supplied air respirator approved by the Mine Safety and Health Administration and NIOSH.
- B. Fully encapsulating chemical-resistant suit
- C. Inner gloves, chemical-resistant
- D. Boots, chemical-resistant, steel toe and shank. Depending on suit construction, worn over or under suit boot.
- E. Two way radio communication
- F. Optional equipment: coveralls, long cotton underwear, hard hat, disposable gloves and boot covers, cooling unit.

Fully encapsulating suits are primarily designed to provide a gas-tight or vapor-tight barrier between the wearer and the atmospheric contaminants. Therefore, Level A is generally worn when high concentrations of airborne substances that could severely affect the skin are known or presumed to be present.

LEVEL B (to be worn when the highest level of respiratory protection is needed, but a lesser degree of skin protection is needed.)

- A. Pressure-demand, supplied air respirator approved by NIOSH
  - B. Chemical resistant clothing
  - C. Outer gloves, chemical resistant
  - D. Inner gloves, chemical resistant
  - E. Outer boots, chemical resistant, steel toe and shank
- DOW RESTRICTED - FOR INTERNAL USE ONLY

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 42 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- F. Hard hat
- G. Two way radio communication
- H. Optional equipment: coveralls, long cotton underwear, disposable boot covers (chemical resistant), face shield.

Generally, if a self-contained breathing apparatus is required, selecting chemical resistant clothing (LEVEL B) rather than a fully encapsulating suit (LEVEL A) is based on need for less protection against known or anticipated substances affecting the skin. Level B skin protection is selected by comparing the concentrations of known or identified substances in the air with skin toxicity data; determining the presence of substances that are either destructive or readily absorbed through the skin by liquid splashes, unexpected high levels of gases, vapors, or particulates, or by other means of direct contact; and assessing the effect of the substance in its measured concentration on small areas left unprotected by chemical resistant clothing.

LEVEL C (to be worn when a lesser level of respiratory protection is needed than Level B. Skin protection criteria are similar to Level B.)

- A. Air-purifying respirator, full-face, canister equipped, approved by the Mine Safety and Health Administration and NIOSH
- B. Chemical resistant clothing
- C. Outer gloves, chemical resistant
- D. Inner gloves, chemical resistant
- E. Outer boots, chemical resistant, steel toe and shank
- F. Hard hat
- G. Two way radio communication
- H. Optional equipment: coveralls or long cotton underwear, disposable outer boot covers (chemical resistant), face shield, escape mask

Level C protection is distinguished from level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for level C is that atmospheric concentrations and other selection criteria permit wearing air-purifying respirators. It is vitally important to conduct air monitoring continuously during any hazardous material incident when atmospheric is known or suspected.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 43 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

LEVEL D (to be worn only as a work uniform and not on any site where respiratory or skin hazards are present. It provides no protection against chemical hazards.)

- A. Coveralls
- B. Boots/shoes, leather or chemical resistant, steel toe and shank
- C. Hard hat
- D. Optional equipment: gloves, safety glasses or chemical splash goggles, face shield, and escape pack

Level D protection may be used only when no contaminants are present and work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

#### PROTECTION IN UNKNOWN ENVIRONMENTS

In all incident response, selecting the appropriate personal protective equipment is one of the first steps in reducing health effects from toxic substances. Until the toxic substances at an incident can be identified and personal safety measures commensurate with the hazards instituted, preliminary safety requirements must be based on experience, judgement, and professional knowledge.

Of primary concern in evaluating unknown situations are atmospheric hazards. Toxic concentrations (or potential concentrations) of vapors, gases, and particulate; oxygen level; and explosive potential all represent immediate atmospheric hazards. In addition to air monitoring to determine these hazards, visual observation and a review of existing data can help to determine potential risks from other materials.

Once immediate hazards (other than toxic substances) have been eliminated, initial site survey and reconnaissance continues. Its purpose is to further characterize toxic hazards and based on these findings, refine preliminary safety requirements. As data is obtained from the initial survey, the Level of Protection and other safety measures are adjusted. Initial data also provide information upon which to base further monitoring and sampling procedures and requirements. No one method can determine a Level of Protection in all unknown environments. Each situation must be examined individually.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 44 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**SPILL CONTROL**

The following equipment is maintained at the plant site and is available for use in spill containment and cleanup.

<u>EQUIPMENT</u>	<u>LOCATION</u>
Backhoe with front end scoop	Maintenance Area
Dump truck - eight (8) yard capacity	Maintenance Area
Two (2) portable three inch diaphragm pumps	Maintenance Area
One (1) sump pump (carbon steel) (air driven)	Maintenance Area
30 Cubic yards sand	Maintenance Area
50 cubic feet of Oil dry	Stores Area
Overpack drums for leaking 55 gallon drums	Shipping Area
One (1) ton Chlorine cylinder repair kit	Utilities Area

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 45 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

## EMERGENCY RESPONSE AND EVACUATION PROCEDURE

### ACTION:

#### WHEN EMERGENCY ALARM IS SOUNDED:

- A) All operating personnel proceed as directed or assemble in their control room.
- B) All visitors report to the area control room.
- C) Maintenance and contract personnel assemble in Maintenance Shop if possible or the area control room.
- D) Multi-Channel Radios are switched to CHANNEL ONE. (Exceptions will be made in operating areas to ensure that department communications are not disrupted and voice contact is maintained. Each operating area shall designate at least one multi channel radio to switch to channel one during emergencies so that emergency communication can be monitored and completed and conditions/actions are noted and implemented.)
- E) In the event of a major spill, it may be safer to remain in the building until the "cloud" passes over. Close all windows and doors. Turn off all exhaust hoods and air conditioning units. Place damp rags or towels along door bottoms. The Evacuation Leader and Incident Commander will determine when it is safe to leave.

#### MAJOR EMERGENCY - SHUTDOWN AND EVACUATION

### RESPONSIBILITY:

Decision to evacuate and type of shutdown to take will be made by the Incident Commander.

Incident Commander or designee directs plant shutdown and evacuation.

- 1) Operators put on personal protective equipment as directed.
- 2) Proceed with established emergency shutdown procedures.
- 3) Conduct head count ---- Send Personnel Inventory Report to Command Center.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 46 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- 4) All personnel use appropriate exit route to designated Rally Point on direction of the Incident Commander.

**EVACUATION: NP Work Area**

- A) North door of NP Control Room to North-South road then to Main plant gate.
- B) East door of NP Control room, then east to North-South road and then to Main plant gate.
- C) West door of NP Control room (at training room), then east to north-south
- 1) North Gate, left on LA 2 across bridge to Simpson's One Stop or right on LA 2 to Union Hall parking lot.
  - 2) South fence emergency exits, take Keystone Road to NorAm Gas Corner
  - 3) Emergency exits in West Perimeter fence. North or South to designated rally point.
- D) Upon arrival at designated rally point, a head count shall be completed to assure that personnel are accounted for.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 47 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EVACUATION: TAC OPERATIONS**

- NPD
- A) North door of NP Control Room to North-South road then to Main plant gate.
  - B) East door of NP Control room, then east to North-South road and then to Main plant gate.
  - C) West door of NP Control room (at training room), then east to North-South Road.
    - 1) North Gate, left on LA 2 across bridge to Simpson's One Stop or right on LA 2 to Union Hall parking lot.
    - 2) South fence emergency exits, take Keystone Road to Nor-Am Corner.
    - 3) Emergency exits in West Perimeter fence. North or South to designated rally points.
  - D) Upon arrival at designated rally point, a head count shall be completed to assure that personnel are accounted for.

- NPC
- A) West door
  - B) South door
  - C) East door
    - 1) Exit North Gate left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall.
    - 2) Exit South fence emergency exits, take Keystone Road to NorAm Gas Corner.
    - 3) Emergency exits in West Perimeter fence. North or South to designated rally point.
    - 4) At designated rally location, a head count shall be taken.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 48 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

### EVACUATION: Buffer Operations

Buffers

- A) West door general process area
- B) South door at Loading dock
- C) North door from clean room
- D) East door from Lab

- 1) Exit North Gate left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall.
- 2) Exit South fence emergency exits, take Keystone Road to NorAm Gas Corner.
- 3) Emergency exits in West Perimeter fence. North or South to designated rally point.
- 4) At designated rally location, a head count shall be taken.

### EVACUATION: NP Warehouse and Shipping

All personnel use the appropriate building exits as noted.

NP Warehouse:

- A) Northwest, Northeast & Southwest personnel doors
- B) Northeast tow motor ramp
- C) Sample room exit door.

Shipping Office: A) All three exits

Proceed to marked Emergency Exits in West perimeter fence.  
Go to Rally point designated by the Incident Commander.

- A) Left on Road to Keystone Road to NorAm Gas Corner
- B) Right on Road to LA 2, either left across bridge to Simpson's One Stop or right to Union Hall parking lot.
- C) At designated rally point a head count shall be taken.



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 49 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EVACUATION: POWER HOUSE - UTILITIES OPERATIONS**

- Powerhouse -
- A) East doors -
  - B) North Door -  
as directed to North-South road and designated rally points.
- 1) Exit North gate, left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall parking lot.
  - 2) Exit South fence emergency exits, take Keystone Rod to NorAm Corner.
  - 3) Alternate emergency exits in West perimeter fence, left or right to designated rally point.
  - 4) At designated rally point, a head count shall be taken

**EVACUATION: CONTROL LABORATORY**

West doors facing North-South Road.  
 Proceed as directed, either

- A) Go to North Gate, proceed East on LA 2 to Union Hall parking lot, or West across bridge to Simpson's One Stop.
- B) Go to South fence emergency exits, take Keystone Road to NorAm Gas Corner
- C) At designated rally point, a head count shall be taken.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 50 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**Evacuation: ADMINISTRATION BUILDING****RESPONSIBILITY:**

Decision to evacuate is made by the Incident Commander.

**Evacuation Wardens:**

Administration/Reg. Affairs  
 MIS  
 Accounting  
 Maintenance  
 Engineering/Drafting  
 Human Resources/Purchasing  
 Technology Center

EH&S Personnel  
 EH&S Personnel  
 Cost Accountant  
 Maintenance Activity Coor.  
 Design Group Leader  
 Human Resources Specialist  
 Improvement Leader

**ACTION:****WHEN EMERGENCY ALARM IS SOUNDED:**

- (1) Assure head count is taken. Check area sign-out log. No one is to leave the building unless they have been told by the evacuation leader to do so. Once evacuation is declared, everyone will be told which direction to travel and where to congregate for head count. Generally egress should be made from North side doors with foot travel to the east or west on LA highway 2 depending on the circumstances. Congregate at the following:
  - a) West - Simpson's One Stop
  - b) East - Union Hall Parking Lot
- (2) In the event of a major spill or chemical release and a decision is made to shelter-in-place, the following should be done:
  - a) Shut down air conditioning / heating system. Shutdown for HVAC is located in equipment / motor control on south exit hall and each rest room. Exhaust fan must be turned off to isolate exhaust.
  - b) Standby and listen for announcements over PA or through radio, for further instructions and/or when it is safe to exit.
- (3) Evacuation Wardens are responsible for assuring that personnel have left building and taking head count at evacuation congregation point.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 51 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EVACUATION: Pilot Plant**

All personnel use appropriate building exits as noted. Follow directions given by Incident Commander.

- (1) From second floor use North door then proceed east to external stairway or use East door via motor control center to access plant road.
- (2) From ground floor use South door to proceed to plant road.
- (3) Specific direction for evacuation will be dependent on specifics of incident. Listen for specific direction of travel from Incident Commander. General evacuation routes are as follows:
  - (A) Exit North Gate go left (west) on LA Hwy 2, cross bridge to Simpson's One Stop or go right (East) on Hwy 2 to Union Hall.
  - (B) Exit through South fence at nearest emergency exit point (east on plant road at north/south junction, go through emergency gate.) Continue South through Koch Nitrogen to NorAm Gas Corner.
  - (C) If North or South egress is unattainable exit through East or West fence at nearest emergency egress point, then proceed as follows:
    - (1) East exit follow Solvent Ave. To LA Hwy 2 then proceed East to Union Hall
    - (2) West exit follow river road to LA Hwy 2 then proceed West to Simpson's One Stop.
  - (D) At rally point take head count and report to incident commander.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 52 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EVACUATION: Store Room**

- 1) Use exit doors as directed:
  - a) North side receiving door.
  - b) South side through check out area.
- 2) Go to designated rally point, ensure that a head count is taken to account for all personnel.

Exit north gate, left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall parking lot.

**Evacuation: Breck Construction Shop (General Contractor)**

- 1) Use North, South or East doors as directed.
- 2) Go to designated rally point.
  - a) Exit North Gate, left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall parking lot.
  - b) Exit South fence emergency exits, take Keystone Road to NorAm Gas Corner.
  - c) At designated rally point, a personnel head count shall be taken.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 53 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EVACUATION: Maintenance Shop**

- 1) Use exit door as directed.
- 2) Go to designated rally point.
  - a) Exit North Gate, left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall parking lot.
  - b) Exit south fence emergency exits, take Keystone Road to NorAm Gas Corner.
  - c) At designated rally point, a head count shall be taken.

**EVACUATION: Copeland(Contract)Electrical**

- 1) Use exit doors as directed by Evacuation Leader.
  - a) Exit North Gate, left on LA 2 across bridge to Simpson's One Stop, or right on LA 2 to Union Hall parking lot.
  - b) Exit south fence emergency exits, take Keystone Road to NorAm Gas Corner.
  - c) At designated rally point, a head count shall be taken.

<p><b>ANGUS</b></p>	<p><b>ANGUS CHEMICAL COMPANY</b></p>	<p>DOC #: SAR\SAF\EMGPLN  Date: 01/12/2005  Rev: 01.4  Page 54  Approval: P.F. Normand</p>
<p><b>Emergency Response Plan Manual</b></p>		

MAJOR CHEMICALS

IN AND OUT OF PLANT

INDEX:

\*AMMONIA(CAS # 7664-41-7)

BUTANOL(CAS # 71-36-3)

C<sub>4</sub>H<sub>9</sub>OH

\*CHLORINE(CAS # 7782-50-5)

Cl<sub>2</sub>

FORMALDEHYDE(CAS # 50-00-0)

HCHO

HYDROGEN(CAS# 1333-74-0)

H<sub>2</sub>

METHANOL(CAS # 67-56-1)

CH<sub>3</sub>OH

NITROPARAFFINS AND DERIVATIVES

\*NITRIC ACID(CAS # 7697-37-2)

HNO<sub>3</sub>

PROPANE(CAS # 74-98-6)

C<sub>3</sub>H<sub>8</sub>

SODIUM CARBONATE(CAS # 497-19-8)

Na<sub>2</sub>CO<sub>3</sub>

SODIUM HYDROXIDE

NaOH

SULFURIC ACID(CAS # 7694-93-9)

H<sub>2</sub>SO<sub>4</sub>

\*SULFUR DIOXIDE(CAS # 7449-09-5)

SO<sub>2</sub>

\*TRIMETHYLAMINE(CAS # 75-50-3)

TMA

\*Considered the most likely to affect the general public in case of spills or leaks.

Underlined - Produced at Sterlington.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 55 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Ammonia

Storage: N/A

Transportation: Pipeline from KOCH

Spill Handling: Gaseous under normal pressure and temperature. Colorless gas and liquid with pungent, irritating, penetrating odor.

Stable under normal conditions. Avoid heat, which will cause it to vaporize. Avoid strong acids, ammonia reacts with chlorine, bromine, mercury, silver, silver solder, and hypochlorite to form explosive compounds. Avoid the use of nonferrous metals.

Presence of oil increases fire hazard. Reacts vigorously with water, causing splattering.

Ammonia is a non-flammable gas, but concentrations in air of 16 - 25 percent can explode on contact with sources of ignition. Use water fog to extinguish, do not direct water streams directly on liquid ammonia pool.

Use water fog to absorb ammonia vapor from air. Contain liquid spill and allow to evaporate. Evacuate area down wind of spill. Direct contact with liquid will cause frostbite.

Use self-contained breathing apparatus and Class A suit to approach the leak.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 56 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Butanol

Storage: Storage tank

Transportation: Tanker transport

Spill Handling: Butanol is a flammable liquid. Routes of exposure for butanol are Ingestion, Inhalation, Skin and Eye contact.

Spill: Avoid breathing vapors. Do not enter spill area or attempt to fix leak without adequate personal protective equipment. Wear self-contained breathing apparatus and full body protection.

Note wind direction, move up wind or at right angles. Immediately evacuate area down wind for one half mile.

Vapors are heavier than air and will collect in low places. Use Water fog to control vapors.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A chemical suit.



ANGUS	ANGUS CHEMICAL COMPANY	DOC # : SAR\SAF\EMGELN Date: 01/12/2005 Rev: 01.4 Page 57 Approval: P.F. Normand
Emergency Response Plan Manual		

CHEMICAL:

CHLORINE

STORAGE:

One Ton Cylinders - No pressure relief. Fusible plugs sensitive at 160-170° F.

TRANSPORTATION:

Truck

SPILL HANDLING:

Physiological effects are primary concern. Very low concentrations are extremely irritable to eyes and nose discouraging person from voluntarily remaining in a concentration which would be injurious.

Fire Hazard - None, however flammable gases and vapors will form explosive mixtures with it. Spill produces a greenish-yellow cloud which will stay at ground level.

Note wind direction, move up wind, or at right angles to cloud. Do not move toward or enter cloud.

Immediately evacuate area down wind for about one mile and one-half mile across. Further evacuation down wind, up to two miles may be necessary depending on nature and control of spill.

Vapor will cause immediate irritation of nose and throat.

Apply water spray to vapor cloud-down stream of spill. Do not apply water directly to leak as hydrochloric acid is formed which is extremely corrosive. Water spray may be used to direct vapors away from men controlling the leak.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A chemical suit.

Notify Utilities Supt. or Stills Board Operator if leak repair kit is needed.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 58 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**Chemical:** Formaldehyde

**Storage:** 2 Nitrogen Blanketed 19,600 gallon, 304 Stainless Steel tanks

**Transportation:** Tanker

**Spill Handling:** Formaldehyde is an irritating material at very low concentrations. The OSHA established PEL is 0.75 ppm. The routes of exposure are Inhalation, Ingestion, and Absorption. The material may cause an allergic skin reaction, and can be a sensitizing agent.

Fire Hazard - slight, use water, dry chemical or carbon dioxide.

Spill - produces a colorless vapor cloud, that will stay at ground level.

Note wind direction, move up wind, or at right angles to cloud. Do not move toward or enter the cloud.

Immediately evacuate area down wind for about one half mile in all directions, further evacuation down wind, may be necessary.

Vapor will cause immediate irritation of nose, throat, and eyes.

Apply water spray to vapor cloud-down wind. If spill occurs near water, every attempt should be made to prevent non-diluted product from reaching water or water shed. Formaldehyde is soluble with water.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A chemical suit.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 59 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: **Hydrogen**

Storage: Pressurized tanks operating at 1000 - 2200 psig

Transportation: N/A generated on site

Spill Handling: Hydrogen is an extremely flammable material, hydrogen flame is nonluminous. This material is an asphyxiant, causes displacement of oxygen in the air. The routes of exposure for hydrogen are Inhalation, and Skin contact. This material can cause frostbite.

Hydrogen is a stable material, but it can react vigorously with oxidizing materials.

Spill: Avoid breathing vapors. Vent to atmosphere at slow rate in safe outdoor location.

Note wind direction, move up wind or at right angles. Immediately evacuate area down wind for one half mile.

Water spray can be used to control vapors, this material is lighter than air.

Keep non-involved and unnecessary personnel away at a safe distance. Persons controlling a leak should wear self-contained breathing apparatus and full bunker gear.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 60 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Methanol

Storage: Storage tank

Transportation: Tanker transport

Spill Handling: Fire Hazard: Methanol is a flammable liquid, the vapors of this material are heavier than air. Avoid contact with strong oxidizing agents. Extinguishing media consist of alcohol foam, carbon dioxide, or dry chemical.

Spill: Eliminate all sources of ignition. Absorb liquid on vermiculite, floor absorbent, or other absorbent material.

Note wind direction, move up wind, or at right angles to cloud. Do not move toward or enter cloud.

Immediately evacuate area down wind for about one half mile. Further evacuation down wind, may be necessary depending on nature and control of spill.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A chemical suit.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 61 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

CHEMICAL:**NITRIC ACID**STORAGE:

Stainless Steel Tanks

TRANSPORTATION:

Stainless Steel Acid Trailers

SPILL HANDLING:

The nitric acid spill will emit reddish-brown vapors of nitrogen dioxide. The vapors cause lung, nose and throat damage and nausea in larger concentrations. The nitric acid in contact with the skin produces severe burns with probable tissue loss.

Fire Hazard - Nitric acid is not a fire hazard itself, but because of its action on most materials, it may cause fire to result.

Note wind direction, move up wind, or at right angles to cloud. Do not move toward or enter the cloud.

Apply water spray to the spill to dilute the acid and absorb the fumes given off.

Persons controlling a liquid leak shall wear breathing apparatus and Class A chemical suit.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 62 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Propane

Storage: Pressurized tank operating at 80-100 psig

Transportation: Tanker transport

Spill Handling: Fire Hazard - Extremely Flammable material. Propane is incompatible with strong oxidizers, conditions to avoid include heat, sparks, and flame. Vapors are heavier than air, so vapors will accumulate in low places.

Note wind direction, move up wind or at right angles. Immediately evacuate area down wind for about one-half mile, or further if conditions indicate.

Avoid breathing vapors. Vent to atmosphere at slow rate in safe outdoor location. Keep away from all sources of ignition.

Keep all non-involved and unnecessary personnel away at a safe distance. Persons controlling leak should wear self-contained breathing apparatus, and bunker gear.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 63 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Sodium Carbonate

Storage: Hopper

Transportation: Rail car

Spill Handling: Physiological effects are primary concern. Material is irritating to eyes, skin, and mucous membranes.

Fire Hazard: None

Spill Hazard: Keep dry and contain as a solid. Soda Ash solutions may be neutralized to pH 7 with Hydrochloric Acid. Prevent large quantities from contact with waterways or vegetation.

Persons controlling leak or cleaning up spill should wear self-contained breathing apparatus and chemical protective clothing.

All non-involved personnel should be kept out of area.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 64 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Sodium Hydroxide

Storage: Storage Tank

Transportation: Tanker transport

Spill Handling: Sodium Hydroxide is irritating to skin, eyes, lungs, and throat. Remaining in areas with irritating vapors could be injurious.

Fire Hazard: Non-Combustible solid, but when in contact with water may generate sufficient heat to ignite combustible materials.

Avoid contact with water, acid, flammable liquids, organic halogens, metals such as aluminum, tin and zinc, and nitromethane. This material is corrosive to metals.

Avoid breathing vapors. Do not enter spill area or attempt to fix leak without adequate personal protective equipment. Wear Self-contained breathing apparatus and full body protection.

Small spills should be removed by sweep, scoop, or pick up the spilled materials and dispose of this material properly. If leak develops in a container within a congested area, every effort should be made to transfer the leaking container to a place where fewer people will be exposed.

Contaminated absorption material should be placed in a proper waste disposal container, and environmental be notified as soon as possible for proper disposal requirements.



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGELN Date: 01/12/2005 Rev: 01.4 Page 65 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: Sulfuric Acid

Storage: Storage Tank

Transportation: Tanker transport

Spill Handling: Reactivity: Avoid contact with organic materials, chlorates, carbides, fulminates, water powdered metals and amines. Reacts violently in water with evolution of heat. Corrosive to metals.

Fire Hazard: None, however this material is capable of igniting finely divided combustible materials.

Spill: Avoid breathing vapors. Do not enter spill area or attempt to fix leak without adequate personal protective equipment. Wear self-contained breathing apparatus and full body protection.

Note wind direction, move up wind, or at right angles to cloud.

Immediately evacuate area down wind for about one-half mile in all directions.

Vapors will cause immediate irritation of nose and throat.

Spills should be flushed with copious amounts of water and neutralize with lime or soda ash.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A chemical suit.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 66 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

CHEMICAL:**SULFUR DIOXIDE**STORAGE:

Pressurized tank operating at 80-100 psig

TRANSPORTATION:

Truck, Rail Tank car

SPILL HANDLING:

Physiological effects are primary concern. Low concentrations are extremely irritable to eyes and nose discouraging person from voluntarily remaining in a concentration which would be injurious.

Fire Hazard - None.

Liquid leaks will immediately cool to 14° F and will cause skin or eye burns on contact. Vapor cloud will stay on ground as SO<sub>2</sub> is heavier than air.

Note wind direction, move up wind or at right angles. Immediately evacuate area down wind for about one mile and one-half mile across.

Water spray can be used to control vapors down stream of liquid, but should not be applied directly to leak as sulfurous acid is formed which is extremely corrosive.

Persons controlling a liquid leak should wear self-contained breathing apparatus and Class A Chemical suit.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR/SAF/EMGPLN Date: 01/12/2005 Rev: 01.4 Page 67 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Chemical: **Trimethylamine**

Storage: Pressure cylinder/Pressurized Bullet  
10 to 50 PSIG

Transportation: Box trailer transport/Liquid tank transport

Spill Handling: The routes of exposure for Trimethylamine are listed as Ingestion, Inhalation, Skin and Eye absorption. This material is irritating to skin and mucous membranes, and liquid forms can cause frostbite.

Fire Hazard: This material is a class 1A flammable liquid or gas. Materials to avoid are strong oxidizers such as bromine, ethylene oxide, nitrosating agents (ie sodium nitrate). Contact with mercury can cause explosive reaction, vapors may travel considerable distance and flash back.

Spill: Remove all ignition sources and stop leak if without risk. Do not touch spilled liquid. Use water spray to reduce vapors. Isolate area until gas has dispersed. Dike or retain dilution water or water from fire fighting for later disposition. Neutralize dilute solutions with 5% sulfuric acid before disposal. Eliminate any ignition sources and provide ventilation.

Immediately evacuate area around spill for one-half mile. Further evacuation down wind may be necessary depending on nature and control of spill.

Persons controlling leak should wear self-contained breathing apparatus and Class A suit.

ANGUS	ANGUS CHEMICAL COMPANY	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 69 Approval: P.F. Normand
Emergency Response Plan Manual		

## STERLINGTON TOWN PLAN:

 EMERGENCY NOTIFICATION  
 FOR THE CITY OF STERLINGTON

## I. PURPOSE:

To provide information on the manner in which ANGUS personnel will notify the city of Sterlington in the event of an incident at the ANGUS Sterlington plant that will or which has the potential to adversely affect the community surrounding the plant.

## II. SITUATION:

In the event of an incident that will go beyond the confines of the ANGUS Sterlington plant, the community is to be promptly notified. The community will generally be notified through an automated visual message board. The emergency message read out apparatus are situated at the following locations:

- Sterlington Medical Clinic
- Sterlington Town Hall
- ~~Sterlington High School~~
- Sterlington Elementary School

The message system is capable of providing limited written messages which are as follows:

- Test.
- All clear.
- Chemical spill - Recommend shelter in place.
- Recommend evacuation.
- Fire - standby for more information.

The system is activated by auto dial from ANGUS' emergency response center in the NP control room. Once the community has been informed, it will be at the discretion of local law enforcement as to what action is taken. If a definite need for evacuation or other evasive action is recognized by ANGUS, ANGUS will emphatically inform 911 response organization of the need to take prompt action. The Local Emergency Planning Committee will implement specific community response plans depend on the nature and specifics of the emergency and its perceived affects on the surrounding community.

DOW RESTRICTED - FOR INTERNAL USE ONLY

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 69 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

### III. PROCEDURE:

1. Ouachita Parish Sheriff's Department  
 Upon receipt of the call from ANGUS, the Sheriff's Department will notify the following:
  - a. Sterlington Police Chief
  - b. State Police
  - c. Ouachita Parish Fire Department
  - d. Ouachita Civil Defense Agency
2. Ouachita Parish Fire Department  
 The Ouachita Parish Fire Department will respond to the designated command post and will coordinate incident command with the plant incident commander, and the response agencies as required.
3. Ouachita Parish Sheriff's Office:
  - a. Sheriff's Department along with State Police and Sterlington Police will set up perimeter control on roads and highways as necessary to secure the area.
  - b. Assist in coordination of emergency services and evacuation and security of the area if required.
4. Sterlington Police:
  - a. Assist Sheriff's Department and the State Police in establishing perimeter control to secure the area and limit access to the established Command post.
  - b. If Incident Command determines evacuation is necessary, assist the State Police and Sheriff's Department in implementing evacuation procedures.
5. Ouachita Civil Defense Agency:
  - a. Activate the Parish EOC, as needed
  - b. Notify the American Red Cross to man shelters, if required.
  - c. Coordinate other agencies as needed.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: .01.4 Page 70 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

#### IV. COMMAND POST LOCATIONS:

Depending upon incident and weather conditions:

- A) Off site at location specified by incident commander.  
 Potential locations include parking lot of Monroe Oil & Gas or entrance to NorAm Gas on Keystone Road.
- B) PHA conference room of the Administration Building.

#### V. EVACUATION:

##### A. Potential Evacuations

- 1) Sterlington Clinic due North, across the street from site.
- 2) Heavily populated residential areas North and East of site.
- 3) A. L. Smith Elementary School one mile Northeast of site.
- 4) Business district North of site.
- 5) Sparsely populated residential areas West and South of site.
- 6) Louisiana Power and Light Generating Station one-half mile North of site.

##### B. Available Evacuation routes/Roadblock Locations

- 1) LA 2 East and West.
- 2) LA 553 South.
- 3) U. S. 165 North and South.
- 4) Keystone Road East and West.
- 5) Numerous Parish Roads.

##### C. EVACUATION:

- 1) Evacuation of the Sterlington population will be implemented along pre-established routes:
  - a. LA 2 West.
  - b. LA 2 East.
  - c. LA 553 South.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 71 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- 2) Evacuees will assemble at predetermined shelters manned by the American Red Cross as designated by Ouachita Civil Defense as outlined in the Parish Emergency Plan. Head counts will be taken to assure all personnel are accounted.
- 3) Return of Evacuees will take place when in the opinion of ANGUS and the HAZMAT Division of Louisiana State Police, the public safety is no longer threatened by the release.

VI. ADDITIONAL CONCERNS:

- A. KOCH Company three-fourth mile South on Keystone Road.
- B. Louisiana Power and Light Generating Station one mile North.
- C. NorAm Gas Company one-half mile South on Keystone Road.
- D. Davidson Trucking terminal one-fourth mile South on Keystone Road.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 72 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

**EMERGENCY PLAN MANUAL REVISIONS:**

<u>TITLE</u>	<u>PAGE NO.</u>	<u>ISSUE NO.</u>	<u>DATE</u>	<u>AUTH.</u>
1) EMERGENCY PLAN MANUAL	Issue No. 1	supersedes all	previous	
	copies.	9/15/92		
2) EMERGENCY PLAN MANUAL	Issue No. 2	supersedes all	previous	
	copies.	2/28/93		
3) EMERGENCY PLAN MANUAL	Issue No. 3	supersedes all	previous	
	copies.	3/25/94		
4) EMERGENCY PLAN MANUAL	Issue No. 4	supersedes all	previous	
	copies.	9/15/94		
5) EMERGENCY PLAN MANUAL	Issue No. 5	supersedes all	previous	
	copies.	5/10/95		
6) EMERGENCY PLAN MANUAL	Issue No. 6	supersedes all	previous	
	copies.	3/27/96		
7) EMERGENCY PLAN MANUAL	Issue No. 7	supersedes all	previous	
	copies.	10/31/96		
8) EMERGENCY PLAN MANUAL	Issue No. 8	supersedes all	previous	
	copies.	3/31/98		
9) EMERGENCY PLAN MANUAL	Issue No. 9	supersedes all	previous	
	copies.	8/31/99		
10) EMERGENCY PLAN MANUAL	Issue No. 10	supersedes all	previous	
	copies.	3/30/2000		
11) EMERGENCY PLAN MANUAL	Issue No. 11	supersedes all	previous	
	copies.	12/19/2001		
12) EMERGENCY PLAN MANUAL	Issue No. 12	supersedes all	previous	
	copies.	7/17/2003		



<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 73 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

- 13) EMERGENCY PLAN MANUAL Issue No. 13 supersedes all previous copies.
- 14) EMERGENCY PLAN MANUAL Issue No. 14 supersedes all previous copies.
- 15) EMERGENCY PLAN MANUAL Issue No. 15 supersedes all previous copies. 12/10/2004

#### **APPENDIX A**

##### **Headcount Procedure**

1. Headcount shall be reported to the designed Headcount coordinator via radio channel 2 or phone ext. 104 (between 7:30 AM and 4:00 PM Monday - Friday) or ext. 253 on holidays, weekends and between 4:00 PM and 7:30 AM.
2. Wait for the Headcount coordinator to call for your area, if you are not ready to report the count, reply with "Pass", and the coordinator will come back to you after working through the list.
3. When reporting Headcount give the following information to the Headcount coordinator:
  - a. Area reporting
  - b. Total number present and names of additional personnel
  - c. Total number missing and names of missing personnel
4. When reporting via radio, key the radio and wait two seconds before speaking, this will allow the repeater to activate, therefore not cutting off the first few words of the transmission.

<b>ANGUS</b>	<b>ANGUS CHEMICAL COMPANY</b>	DOC #: SAR\SAF\EMGPLN Date: 01/12/2005 Rev: 01.4 Page 74 Approval: P.F. Normand
<b>Emergency Response Plan Manual</b>		

Appendix B  
Site Plot Plan

## **SECTION THREE**

### **Standard Permit Application Part II Supplementary Information**

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#### **ATTACHMENT I FINANCIAL ASSURANCE**

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**URS**



2030 DOW CENTER

March 27, 2006

Secretary  
Louisiana Department of Environmental Quality  
PO Box 4313  
Baton Rouge, LA 70821-4313  
Attention: Office of Environmental Services  
Water and Waste Permits Division

Dear Sir or Madam:

I am the chief financial officer of The Dow Chemical Company, 2030 Dow Center, Midland, Michigan, 48674. This letter is in support of the firm's use of the financial test to demonstrate financial responsibility for liability coverage, closure and post-closure, as specified in LAC 33:VII.727.A.1 and A.2.

1. The firm identified above is the permit holder of the following solid waste facilities, whether in Louisiana or not, for which liability coverage is being demonstrated through the financial test specified in LAC 33:VII.727.A.1. The amount of annual aggregate liability coverage covered by the test is shown for each facility:

<u>STATE ID#</u>	<u>NAME/ADDRESS</u>	
GPD0470107 P-0069	The Dow Chemical Company Block 80 Industrial Solid Waste Landfill Pactherm Burner PO Box 150 Plaquemine, LA 70765	<b>Annual Aggregate = \$1,000,000</b>

2. The firm identified above is the permit holder of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for closure and post-closure is demonstrated through a financial test similar to that specified in LAC 33:VII.727.A.2 or other forms of self-insurance. The current closure and post-closure cost estimates covered by the test are shown for each facility:

GPD0470107 P-0069	The Dow Chemical Company Block 80 Industrial Solid Waste Landfill Pactherm Burner PO Box 150 Plaquemine, LA 70765	<b>Closure = \$5,911,179</b> <b>Post-Closure = \$1,133,335</b> <b>Pactherm Closure = \$26,235</b>
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3. This firm guarantees through a corporate guarantee similar to that specified in LAC 33:VII.727.A.1 and A.2, closure and post-closure care of the following solid waste facilities, whether in Louisiana or not, of which Angus Chemical Company is a subsidiary of this firm. The amount of annual aggregate liability coverage covered by the guarantee for each facility and/or the current cost estimates for the closure and/or post-closure care so guaranteed is shown for each facility:

GD0733625

Angus Chemical Company  
Waste Water Treatment Plant Lagoon  
5000 Horseshoe Lake Road  
Sterlington, LA 71280

**Annual Aggregate = \$1,000,000**  
**Closure = \$591,214**  
**Post-Closure = \$310,538**

4. This firm is the owner or operator of the following solid waste facilities, whether in Louisiana or not, for which financial assurance for liability coverage, closure and/or post-closure care is not demonstrated either to the U.S. Environmental Protection Agency or to a state through a financial test or any other financial assurance mechanism similar to those specified in LAC 33:VII.727.A.1 and/or A.2. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility:

None.

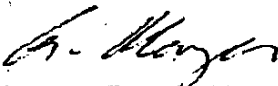
This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 2005.

**PART C. LIABILITY COVERAGE, CLOSURE, AND/OR POST-CLOSURE  
ALTERNATIVE II**

1. Sum of current closure and post-closure cost estimates (total of all cost estimates listed above)	\$7,972,501	
2. Amount of annual aggregate liability coverage to be demonstrated	\$1,000,000	
3. Sum of lines 1 and 2	\$8,972,501	
4. Current bond rating of most recent issuance and name of rating service	A- (S&P)	
5. Date of issuance of bond	November 22, 2002	
6. Date of maturity of bond	November 15, 2007	
*7. Tangible net worth (if any portion of the closure or post- closure cost estimates is included in "total liabilities" on your financial statements you may add that portion to this line)	\$11,741,000,000	
*8. Total assets in the U.S. (required only if less than 90% of assets are located in the U.S.)	\$24,652,000,000	
	<u>YES</u>	<u>NO</u>
9. Is line 7 at least \$10 million?	X	
10. Is line 7 at least 6 times line 3?	X	
*11. Are at least 90% of assets located in the U.S.? If not complete line 10.		X
12. Is line 8 at least 6 times line 3?	X	

I hereby certify that the wording of this letter is identical to the wording specified in LAC 33:VII.727.A.2.i.iv.(e).

  
Geoffery E. Mefszel  
Executive Vice President  
And Chief Financial Officer  
The Dow Chemical Company

March 27, 2006

cc: Michele Osmun, The Dow Chemical Company, 2030 Dow Center, Midland, MI  
Richard Durham, The Dow Chemical Company, Plaquemine, LA  
Ron Poindexter, Angus Chemical Company, Sterlington, LA

NOTE: Please direct all correspondence related to this letter to Michele Osmun, 2030 Dow Center, Midland, MI 48674. Phone (989) 636-5581 or Fax (989) 638-9636.



Deloitte & Touche LLP  
Suite 400  
3320 Ridgcrest Drive  
Midland, MI 48642-5859  
USA

Tel: +1 989 631 2370  
Fax: +1 989 631 4485  
www.deloitte.com

## INDEPENDENT ACCOUNTANTS' REPORT ON APPLYING AGREED-UPON PROCEDURES

To the Board of Directors  
The Dow Chemical Company  
Midland, Michigan

We have performed the procedures included in the Code of Federal Regulations ("CFR"), Title 40, Part 264, Section 143 (40 CFR 264.143), which were agreed to by the Louisiana Department of Environmental Quality – Office of the Environmental Services, Water and Waste Permits Division (SW) - Secretary and The Dow Chemical Company ("Dow"), solely to assist the specified parties in evaluating Dow's compliance with the financial test option as of December 31, 2005, included in the accompanying letter dated March 27, 2006 from Mr. Geoffery E. Merszei of Dow. Management is responsible for Dow's compliance with those requirements. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. The sufficiency of these procedures is solely the responsibility of the parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

The procedures that we performed and related findings are as follows:

We recomputed from, or reconciled to, the audited consolidated financial statements of Dow as of and for the year ended December 31, 2005, on which we have issued our report dated February 8, 2006 (which report expresses an unqualified opinion and includes an explanatory paragraph relating to a change in the method of accounting for stock-based compensation to conform to Statement of Financial Accounting Standards No. 123 for new grants of equity instruments to employees) the information included in Items 7, 8 and 11 under the caption Alternative II in the Letter referred to above and noted no differences.

We were not engaged to, and did not, perform an examination, the objective of which would be the expression of an opinion on the accompanying letter dated March 27, 2006. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the board of directors and management of Dow and the specified parties listed in the first paragraph, and is not intended to be and should not be used by anyone other than these specified parties.

*Deloitte & Touche LLP*

March 27, 2006

**SOLID WASTE FACILITY**  
**CORPORATE GUARANTEE FOR LIABILITY COVERAGE,**  
**CLOSURE, AND/OR POST-CLOSURE CARE**

Guarantee made this 27 day of March, 2006, by The Dow Chemical Company, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor to the Louisiana Department of Environmental Quality, obligee, on behalf of our subsidiary Angus Chemical Corporation of 5000 Horeshoe Lake Road, Sterlington, Louisiana.

**Recitals**

1. The guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in LAC 33:VII.727.A.2.i.ix.
2. Angus Chemical Corporation is the permit holder hereinafter referred to as permit holder for the following solid waste facility covered by this guarantee:

Angus Chemical Corporation  
Waste Water Treatment Plant Lagoon  
5000 Horeshoe Lake Road  
Sterlington, LA 71280

GD0733625

Annual Aggregate \$1,000,000  
Closure = \$591,214  
Post-Closure = \$310,538

3. "Closure plans" as used below refers to the plans maintained as required by the Louisiana Administrative Code, Title 33, Part VII, for the closure and/or post-closure care of the facility identified in Paragraph 2 above.
4. For value received from permit holder, guarantor guarantees to the Louisiana Department of Environmental Quality that in the event that permit holder fails to perform closure and post-closure care of the above facility in accordance with the closure plan and other permit requirements whenever required to do so, the guarantor shall do so or shall establish a trust fund as specified in LAC 33:VII.727.A.2d as applicable, in the name of permit holder in the amount of the current closure and/or post-closure estimates as specified in LAC 33:VII.727.A.2.
5. For value received from permit holder, guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and accidental occurrences arising from operations of the facility covered by this guarantee that in the even that permit holder fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and accidental occurrences arising from the operation of the above-named facility, or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the coverage limits identified above.
6. The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to the administrative authority and to permit holder that he intends to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, in the name of the permit holder within 120 days after the end of such fiscal year, the guarantor shall establish such financial assurance unless permit holder has done so.
7. The guarantor agrees to notify the administrative authority, by certified mail, of a voluntary or involuntary proceeding under Title 11 (bankruptcy), U.S. Code, naming guarantor as debtor, within 10 days after commencement of the proceeding.




8. The guarantor agrees that within 30 days after being notified by the administrative authority of a determination that guarantor no longer meets the financial test criteria or that he is disallowed from continuing as a guarantor of liability or closure and/or post-closure care he shall establish alternate financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2 as applicable, in the name of permit holder unless permit holder has done so.
9. The guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure and or post-closure care, the extension or reduction of the time of performance of closure and/or post-closure or any other modification or alternation of an obligation of the permit holder pursuant to the Louisiana Administrative Code, Title 33, Part VII.
10. The guarantor agrees to remain bound under this guarantee for as long as the permit holder must comply with the applicable financial assurance requirements of LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2 for the above-listed facility except that guarantor may cancel this guarantee by sending notice by certified mail, to the administrative authority and to the permit holder, such cancellation to become effective no earlier than 90 days after receipt of such notice by both the administrative authority and the permit holder, as evidenced by the return receipts.
11. The guarantor agrees that if the permit holder fails to provide alternative financial assurance as specified in LAC 33:VII.727.A.1 and/or LAC 33:VII.727.A.2, as applicable, and obtain written approval of such assurance from the administrative authority within 60 days after a notice of cancellation by the guarantor is received by the administrative authority from guarantor, guarantor shall provide such alternative financial assurance in the name of the permit holder.
12. The guarantor expressly waives notice of acceptance of this guarantee by the administrative authority or by the permit holder. Guarantor expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility permits.

I hereby certify that the wording of this guarantee is identical to the wording specified in LAC 33:VII.727.A.2.i.ix.(1), effective on the date first above written.

Effective date: March 27, 2006

The Dow Chemical Company

  
MGM Geoffrey E. Merszei  
Executive Vice President  
And Chief Financial Officer

Signature of witness or notary:

  
**Michele R. Osman**  
NOTARY PUBLIC, MIDLAND COUNTY, MICHIGAN  
MY COMMISSION EXPIRES JULY 03, 2011  
ACTING IN MIDLAND COUNTY, MICHIGAN

## **SECTION THREE**

### **Standard Permit Application Part II Supplementary Information**

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#### **ATTACHMENT J FINANCIAL ANNUAL REPORT**

---

**URS**



one part vision...



The Dow Chemical Company  
2005 Corporate Report

greater than the sum of its parts

one part

Pursuing our vision to be the largest, most profitable and most respected chemical company in the world: a message from Andrew Liveris

one part

Maintaining a solid foundation of financial discipline and low cost-to-serve capability to ensure that Dow is prepared for whatever lies ahead

one part

Aspiring to the very highest standards of ethical, social and environmental performance in all of our business activities

one part

Creating a company culture that inspires performance excellence among our employees: a people-centric performance culture

one part

Moving in new directions as we target strategic growth opportunities with customers, through new technologies and in emerging geographies

one part

Making it happen in 2005: performance highlights

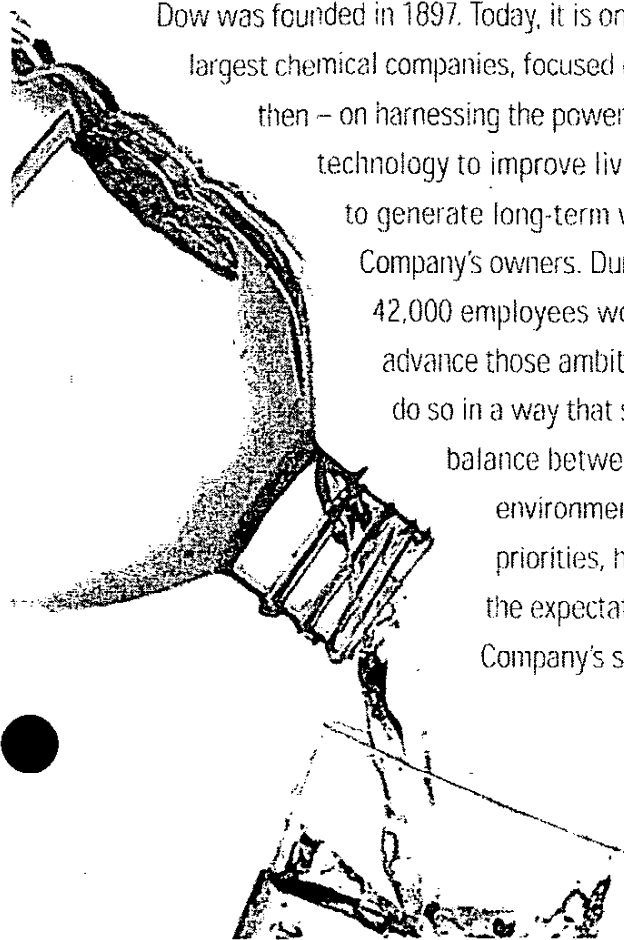
- Financial Performance
- Environmental Performance
- Social Responsibility



Success has many parts: a clear vision of what you want to achieve; a foundation solid enough to support you through good times and through bad; inspirational leaders who set aspirational goals, with the courage and the foresight to move in positive new directions; and a culture focused on action – in which people are empowered to deliver results and are rewarded for their achievements.

At Dow, the combination of those different parts creates a tremendously powerful whole, enabling the Company to soar to new heights in its quest to be the largest, most profitable and most respected chemical company in the world.

Dow was founded in 1897. Today, it is one of the world's largest chemical companies, focused now – as it was then – on harnessing the power of science and technology to improve living daily and to generate long-term value for the Company's owners. During 2005, Dow's 42,000 employees worked hard to advance those ambitions; seeking to do so in a way that struck the right balance between economic, environmental and social priorities, helping to meet the expectations of all of the Company's stakeholders.



#### Performance Plastics

Global businesses include:

- Building and Construction
- Dow Automotive
- Engineering Plastics
- Epoxy Products and Intermediates
- Polyurethanes and Thermoset Systems
- Technology Licensing and Catalyst
- Wire and Cable Compounds

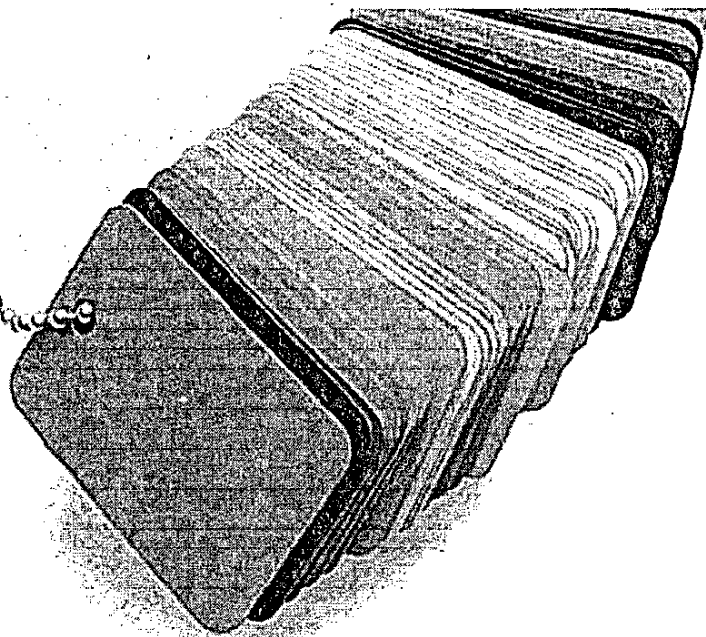
Dow offers an extensive range of high-performance plastics and systems that insulate buildings, make cars safer and more fuel-efficient, and enhance both the functionality and the aesthetics of appliances. They also optimize long-term electrical performance and durability, bring high fashion to consumer electronics, and improve the comfort and durability of carpeting and footwear.

#### Performance Chemicals

Global businesses include:

- Acrylics and Oxide Derivatives
- Dow Latex
- Specialty Chemicals
- Specialty Polymers

Dow provides customers with high-performance chemicals that meet a variety of specialized needs – making drinking water cleaner, diets richer in fiber, and paints and coatings longer lasting. Our products also enhance the quality of pharmaceuticals, building materials, chemical processing, household and personal care products, paper, textiles, carpets and more.



#### Agricultural Sciences

Dow AgroSciences develops, manufactures and markets products that improve crop production; manage weeds, insects and plant diseases; and protect property from pest damage. It is also discovering revolutionary solutions in the plant genetics and bio-technology arena, including agricultural seeds, traits, healthy oils and animal health.

#### Plastics

- Polyethylene
- Polypropylene
- Polystyrene

A variety of basic plastics help keep foods fresh; protect goods during transport; and make consumer packaging lightweight, convenient and appealing. They also keep bottle closures tight and resistant to contaminants; provide fit, functionality and comfort to diapers; make pipes tough and corrosion resistant; improve the durability of toys and tools; and protect crop quality while increasing crop yield.



#### Chemicals

- Core Chemicals
- Ethylene Oxide / Ethylene Glycol

Dow's basic chemicals are used across a host of different industries and also serve as critical raw materials in the production of many products. They make, for example, adhesives stronger, antifreezes and coolants more reliable, household cleaners more effective, and building materials more durable and affordable. And they play a key role in the manufacture of pharmaceuticals, in petroleum refining, in paper production and in a host of other essential industries.

#### Hydrocarbons and Energy

Dow's Hydrocarbons and Energy business is the world leader in the production of olefins and aromatics, and is at the forefront of efforts to secure advantaged feedstock positions in emerging geographies as well as new potential energy and feedstock sources to create long-term competitive advantage for Dow.



#### ► DOW'S VISION

To be the largest, most profitable and most respected chemical company in the world.

#### ► DOW'S MISSION

To constantly improve what is essential to human progress by mastering science and technology.

#### ► DOW'S VALUES

##### *Integrity and Respect for People*

- Integrity -- We believe our promise is our most vital product -- our word is our bond. The relationships that are critical to our success depend entirely on maintaining the highest ethical and moral standards around the world.
- Respect for People -- We believe in the inherent worth of all people.

## 2005 highlights



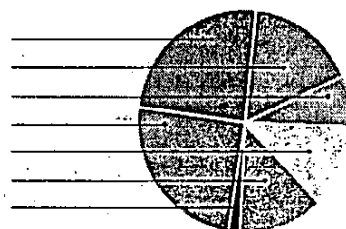
### PERFORMANCE HIGHLIGHTS

	2005	2004
Net Sales	\$46.3 billion	\$40.2 billion
Net Income	\$4.5 billion	\$2.8 billion
Earnings per Share – Diluted	\$4.62 per share	\$2.93 per share
Energy Intensity (BTUs per pound of production)	4,647	4,740
Injury and Illness Rate (recordable incidents per 200,000 work hours)	0.40	0.51
Taxes Paid	\$1.6 billion	\$1.2 billion
Total Purchases	\$43.2 billion	\$39.3 billion
Charitable Contributions	\$23.2 million	\$17.1 million

### 2005 SALES BY OPERATING SEGMENT

(dollars in millions)

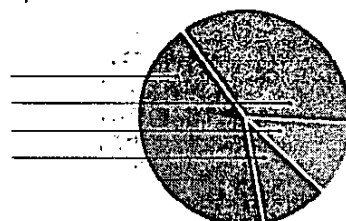
Performance Plastics	\$11,388
Performance Chemicals	\$ 7,713
Agricultural Sciences	\$ 3,364
Plastics	\$11,815
Chemicals	\$ 5,660
Hydrocarbons and Energy	\$ 6,061
Unallocated and Other	\$ 306



### 2005 SALES BY GEOGRAPHIC AREA

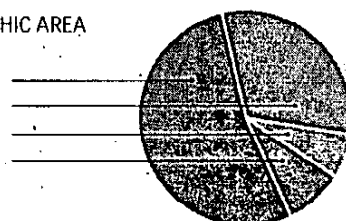
(dollars in millions)

North America	\$19,800
Europe	\$16,624
Asia Pacific	\$ 5,174
Latin America	\$ 4,659



### 2005 EMPLOYEES BY GEOGRAPHIC AREA

North America	22,646
Europe	13,276
Asia Pacific	2,782
Latin America	3,709



### Forward-Looking Statements

The forward-looking statements contained in this document involve risks and uncertainties that may affect the Company's operations, markets, products, services, prices and other factors as discussed more fully elsewhere and in filings with the U.S. Securities and Exchange Commission. These risks and uncertainties include, but are not limited to, economic, competitive, legal, governmental and technological factors. Accordingly, there is no assurance that the Company's expectations will be realized. The Company assumes no obligation to provide revisions to any forward-looking statements should circumstances change, except as otherwise required by securities and other applicable laws. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries, unless otherwise expressly noted.



Office of the Chief Executive



**Front:**

*Andrew N. Liveris, President, Chief Executive Officer and Chairman Elect*

**Left to right:**

*Gary R. Veurink, Corporate Vice President, Manufacturing and Engineering*

*Charles J. Kalil, Corporate Vice President, General Counsel and Corporate Secretary*

*David E. Kapler, Corporate Vice President, Shared Services, and Chief Information Officer*

*Romulo Kreinberg, Executive Vice President, Performance Plastics and Chemicals Portfolio*

*William F. Bartholzer, Corporate Vice President and Chief Technology Officer*

*Julie Fasono Holder, Corporate Vice President, Human Resources, Diversity & Inclusion and Public Affairs*

*Michael R. Gambrell, Executive Vice President, Basic Plastics and Chemicals Portfolio*

*Luciano Rospini, Corporate Vice President, Geography, Marketing and Sales*

*Geoffrey L. Menzies, Executive Vice President and Chief Financial Officer*

*Phillip H. Cook, Corporate Vice President, Strategic Development and New Ventures*



# one part vision

"Our vision – to be the largest, most profitable and most respected chemical company in the world – reflects our conviction that companies have responsibilities that extend beyond financial success."

Andrew Liveris  
President, Chief Executive Officer  
and Chairman-Elect



Over the past decade, accelerating globalization and the rush to free markets have made the world a much more challenging place for all industries. Although we at Dow are mindful that sound financial results, such as the record earnings we posted this year, are essential to our Company's overall success, we know that success must be defined in much broader terms, including environmental stewardship, workplace safety, a commitment to the communities where we work and live and to the general betterment of people's lives.

For Dow, the transition to a broader definition of performance began in earnest 10 years ago when we established our 2005 environmental, health and safety (EH&S) goals – ambitious targets that we hoped would bring about breakthrough change. And they did – helping to raise the bar on EH&S performance across the entire chemical industry.

Our performance against our 2005 EH&S goals was a remarkable success story that few people thought was possible.

Now, we are building on that success by setting even more aggressive goals for 2015. In addition to environmental,

health and safety performance, we will also measure our Company's performance in ethics, governance, and many forms of societal involvement, including philanthropy and voluntarism.

Our new goals seek to engender a greater sense of trust in our Company, ranging from being more transparent in how we make our products to how they contribute to the quality of people's lives; for example, in applications ranging from advanced medicines and high-tech computers to everyday uses like food packaging and cosmetics.

All that said, we are in no doubt that our fundamental responsibility remains to build a company that will generate long-term value for our shareholders. That is why I was so delighted by our performance last year, a year in which we achieved record sales and record profits, maintained an outstanding level of financial discipline, significantly strengthened our balance sheet and further accelerated our strategic growth agenda.

However, knowing that exceptional financial performance alone is no longer enough to be a sustainable enterprise, last year, we developed a new vision for

our Company: *To be the largest, most profitable and most respected chemical company in the world.* This vision reflects our conviction that companies have responsibilities that extend well beyond financial success.

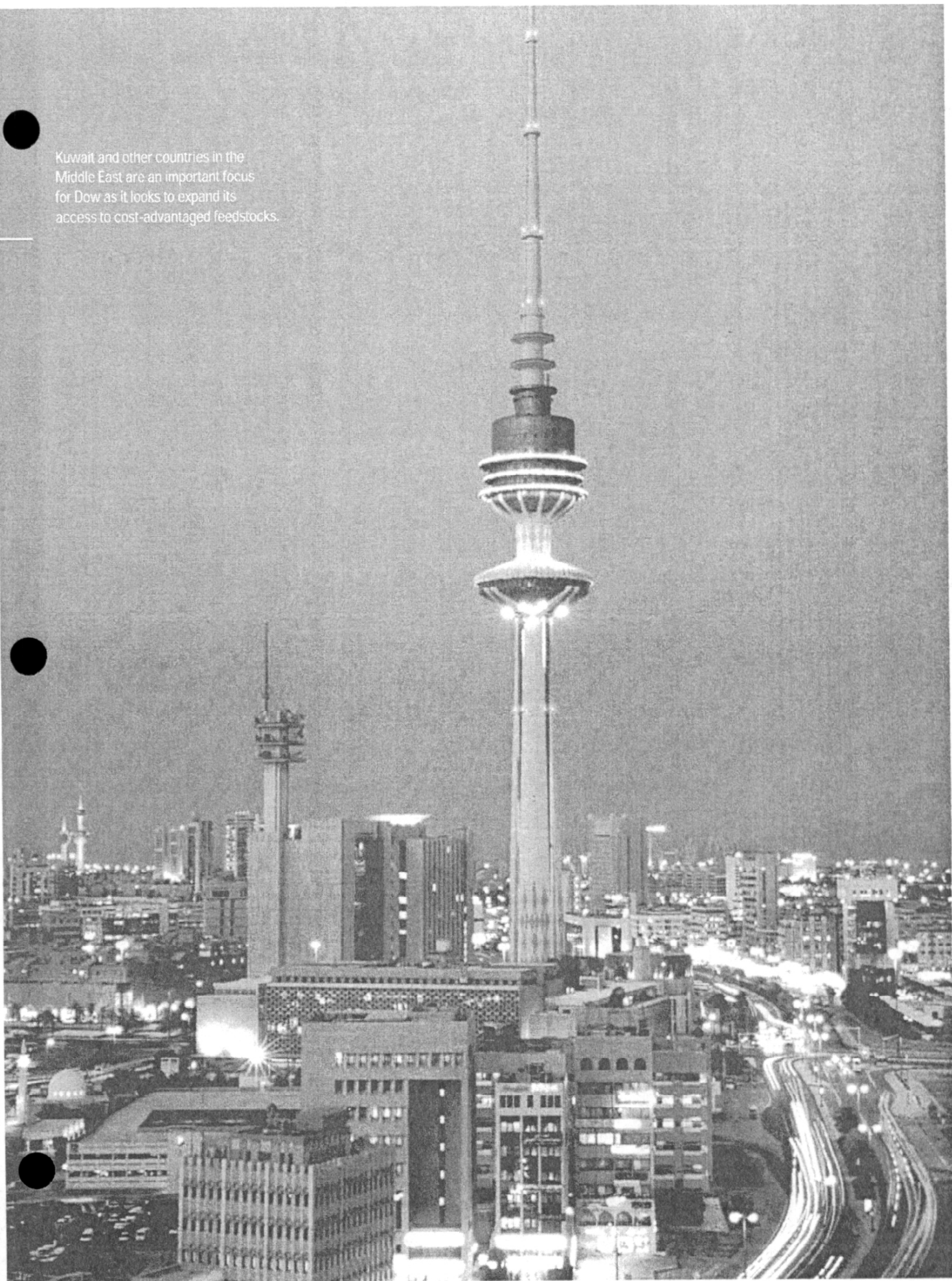
In order to be the "most respected," we must meet the needs of all of our stakeholders: our investors, our customers, our employees and our communities. We think that our new sustainability goals will help us earn that respect – not only by being the best place to invest, but also the best place to work, the best supplier of quality products and the best company to have as a neighbor. This report charts our performance in each of these areas.

We appreciate your interest in our Company, and we welcome your perspective on our performance.

*Andrew Liveris*

Andrew Liveris  
President, Chief Executive Officer  
and Chairman-Elect  
February 8, 2006

Kuwait and other countries in the Middle East are an important focus for Dow as it looks to expand its access to cost-advantaged feedstocks.



# one part foundation

"Partnering with Dow to build a petrochemical plant in Kuwait enables us to combine and complement our strengths, which will accelerate the growth and profitability of both companies. It also enables my own company, Petrochemical Industries Company of Kuwait, to achieve its vision to be a leading player in petrochemicals internationally, while boosting our local economy and job opportunities for Kuwaiti nationals."

Mr. Saad Al-Shuwaib  
Chairman and Managing Director of PIC

During 2005, we set a record for sales and earnings, reduced debt and realized our third consecutive year of margin recovery.

In large part, these achievements were made possible by the solid foundation of financial discipline and low cost-to-serve capability that is in place across our organization.

It is a foundation that helps protect Dow against volatile energy and feedstock costs. It ensures pragmatism and sound judgment in assessing the value of global growth opportunities. It affords us the financial flexibility to respond swiftly when value-creating opportunities arise. And it delivers significant competitive advantage to Dow across the business cycle, helping position the Company for long-term success in an ever-more challenging global business environment.

This foundation embraces four distinct components:

## Low-Cost Feedstocks

Thanks to long-established relationships in the Middle East and in Asia, Dow has access to low-cost feedstock and energy supplies that provide a vital platform for value growth worldwide.

In 2005, we moved forward with several opportunities that will help to strengthen that position further, projects like Olefins II, an ethylene and derivatives complex now under construction in Kuwait, and the petrochemical complex we plan to build at Sohar in Oman.

## Integration

Integration is an important part of our business model. It enables us to take the by-products and the energy that are generated in the creation of one product and use them in the manufacture of other products, thereby reducing costs and eliminating waste. At the same time, it enables us to use our low-cost Basic products as raw materials for our downstream Performance products, yielding higher and more stable margins.

## Productivity

Dow aims to be competitively advantaged in everything we do, and our drive for productivity improvements cuts across every part of the organization. For example, we infuse Six Sigma methodology into every business, every function, every corner of the world; we implement novel research and development approaches that help increase our speed to market;

we remain committed to maintaining best-in-class information technology systems; and we're applying our "operational excellence" mindset, born out of more than a century in manufacturing, to our commercial activities – achieving productivity improvements in everything from our supply chain to technical support.

## Efficiency

Ongoing manufacturing improvements keep our plants running smoothly and efficiently – not only maximizing production but also reducing our energy intensity. For example, co-generation power plants that produce both electricity and steam are now used to meet 85 percent of our energy needs in the United States and 70 percent worldwide, consuming around 40 percent less fuel than required by conventional generators and significantly reducing both costs and emissions. And we're applying advanced control and optimization technology to get more value from existing assets, using process automation systems that analyze all manner of variables – from feedstock costs to weather conditions – and then adjust plant operations to optimize throughput, product quality and profitability.

# one part aspiration

"It's actions that count; and in that respect, Dow's involvement with our communities speaks volumes. They are truly committed to enhancing the life, liberty and enjoyment of their neighbors: advancing race relations, promoting education, strengthening law enforcement, supporting local needs and ensuring the safety and integrity of their operations."

Luis G. Robles  
A member of the Community Advisory Panel  
to the Seadrift site in Texas, U.S.A.

As we shape the Company for future value growth, we recognize that financial performance alone will not ensure long-term success. To endure, we must build a sustainable company that aspires to the very highest standards of ethical, social and environmental performance, maintaining an unrivalled reputation among investors, customers, communities and employees alike.

During 2005, we made significant progress toward realizing those ambitions, not only in the areas of workplace safety and environmental stewardship, but also in relation to corporate governance and social responsibility.

## EH&S Leadership

2005 marked the end of a 10-year drive to improve Dow's performance across an array of aggressive environment, health and safety (EH&S) goals. In 1995, we set out to achieve breakthrough change; and we did - helping to raise the bar on EH&S performance across the entire chemical industry. Now, we are building on that success by setting even more aggressive goals for 2015, goals that will span a broader spectrum of social, ethical and environmental dimensions and will lift the standard for sustainability still higher.

## Community Involvement

Once again in 2005, Dow's presence in communities around the globe provided employment opportunities and tax revenues that helped to strengthen local economies. We also played a role in enhancing the communities in which we operate, addressing specific needs in areas such as education, health, recreation and cultural understanding.

And 2005 was a year in which Dow, its employees and retirees responded swiftly and resourcefully to the extraordinary needs that arose following a number of natural disasters around the globe, donating money, products, time and hospitality to support those who had been impacted by hurricanes, floods and earthquakes.

## Sustainable Solutions

Dow is committed to using science and technology to develop sustainable solutions to world challenges such as climate change, energy, health, food, water and shelter. In 2005, for example, we started producing biodiesel fuel, an alternative source of energy made from renewable resources. We produced an array of products that directly address key environmental issues - from foams and plastics that make cars more fuel-efficient, to membranes and resins

used in filtration systems that will help to ensure sustainable supplies of clean water in communities around the world. And we continued our search for alternative raw material and production technologies that will allow us to meet society's needs in a way that uses less of the world's finite resources and minimizes our impact on the environment.

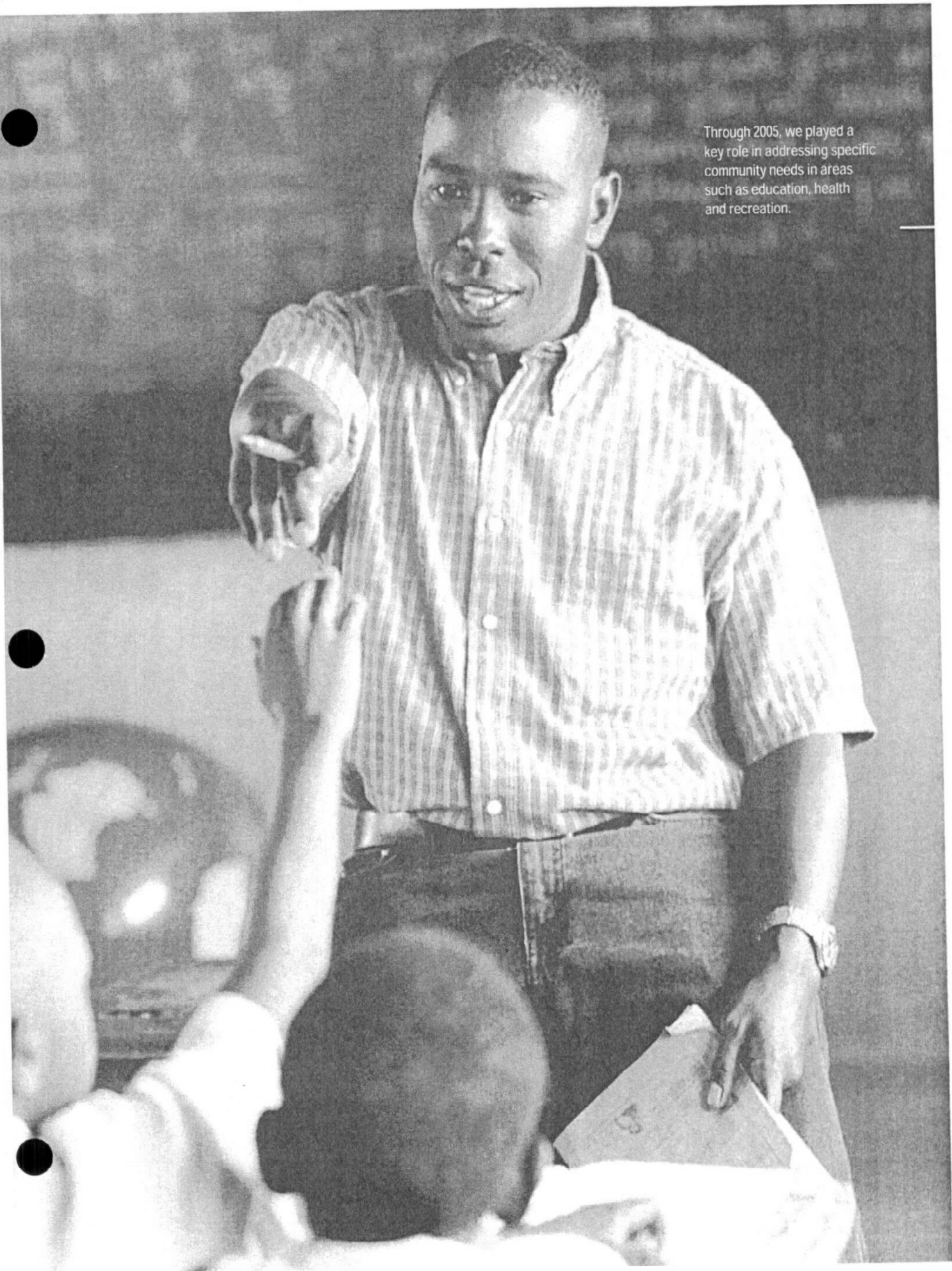
## Exemplary Conduct

Dow's long-standing corporate governance practices and rigorous ethics and compliance program are focused on upholding the very highest standards of integrity and ethical behavior at every level of the Company and in every location.

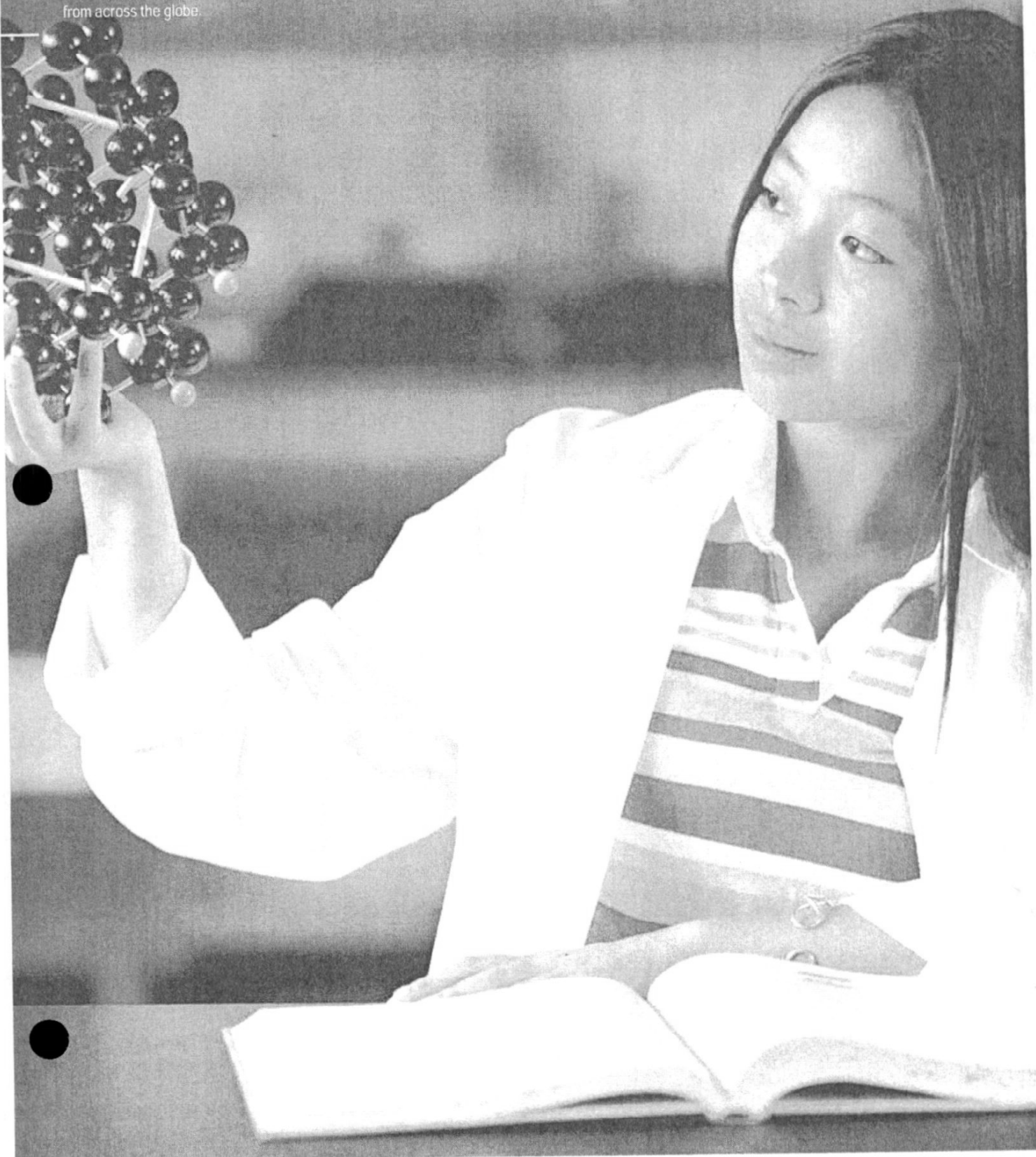
In 2005, we twice received the highest rating possible for corporate governance from GovernanceMetrics International, an independent corporate governance ratings agency that conducts assessments every six months. And the Audit Committee of our Board of Directors was ranked number one in a "fitness for purpose" survey conducted by the University of Chicago of more than 300 U.S. public companies. Dow's corporate governance guidelines and its Code of Business Conduct are available on-line at [www.dow.com](http://www.dow.com).



Through 2005, we played a key role in addressing specific community needs in areas such as education, health and recreation.



Creating a culture of performance  
excellence starts with attracting  
and retaining outstanding talent  
from across the globe.



# one part inspiration

"As an educational institute renowned for the world-class caliber of its graduates, Tsinghua is delighted to have Dow so closely involved in helping develop today's young Chinese talent into tomorrow's top industry professionals. I look forward to expanding our cooperation into new areas of education and research over the years ahead."

Dr. Zheng Liu, Professor and Chairman  
Department of Chemical Engineering, Tsinghua University, China

The quality of Dow's workforce provides the Company with a lasting source of competitive advantage. After all, it is our employees who ultimately determine our success, developing and implementing our growth strategy, differentiating our products and services, ensuring financial discipline and shaping our reputation.

That is why we are fully committed to creating a people-centric performance culture that inspires excellence in all that we do – a culture that attracts and retains outstanding talent from around the world, nurturing their skills and rewarding them appropriately for their contributions to our bottom line.

2005 marked a year of considerable progress, a year in which we took action on several fronts in ways that will benefit not only our investors, our communities and our customers, but also our employees.

## Performance Management

We introduced a new level of discipline to managing employee performance, making further strides toward eliminating ambiguity about how performance is

evaluated and where each employee stands in relation to their peers. The process puts the emphasis on action and holds leaders fully accountable for the development of their people. Built on Dow's long-standing philosophy of "pay for performance," it will continually raise the bar on individual performance by focusing on feedback and development. By creating greater transparency between leaders and employees, we will improve motivation, encourage empowerment and enable our people to deliver their very best.

## Leadership Development

Through a program of mentoring, training and real-world assignments, we are focused on developing a pool of top performers to become the Company's future leaders – individuals with the strategic insight and leadership qualities necessary to forge Dow's future success and to bring out the best in its 42,000 employees. To help make this happen, in 2005 we added new programs to our training curriculum, including the I.H. Dow Academy, featuring courses that are focused on accelerated leader development, sponsored by the Company's senior executives and led by acclaimed academic advisors.

## Diversity and Inclusion

To be successful in today's global economy, international companies like Dow must be able to attract, develop and retain talented people from across the globe, people who can provide a rich mix of skills, perspectives and cultural understanding. That will only happen if we maintain a work environment throughout our organization that is both respectful and inclusive, an environment in which employees are given every opportunity to achieve their full potential, regardless of who they are or where they are from.

Over the past few years, we have made progress toward enhancing diversity and fostering inclusion on a number of fronts. And that progress continued in 2005 as we accelerated our efforts to recruit a workforce that better reflects the places in which we do business, and sought to increase the number of in-country employees, women and U.S. ethnic minorities in leadership positions across the organization.

Dow's leadership team is determined to drive diversity and inclusion to new heights as the Company moves forward with its strategic growth agenda, recognizing that it is not an option, but an imperative for success.

# one part direction

"Our agreement with Dow AgroSciences creates a tremendous opportunity for both companies, combining Sangamo's cutting-edge gene regulation and modification technology with Dow's proven leadership in developing products using agricultural biotechnology. I am confident that our alliance will help maximize the commercial potential of this technology across all fields of use."

Edward Lanphier  
President and CEO, Sangamo BioSciences, Inc.

With facilities in key locations around the world, customers in more than 175 countries and equity in almost 80 joint ventures, Dow has a history of successfully investing for growth. During the past decade, our strategic direction has created a company with strong geographic balance, a diverse business portfolio and a customer base serving a wide range of end-use applications.

It's a model that has served us well – and it will continue to do so as we advance our growth agenda on the following four fronts:

## Portfolio Management

Maximizing value for our shareholders means targeting our investment capital wisely. For this reason, we have characterized each of our businesses by its investment potential – from those that we can grow at above-industry levels, to those that we will run for cash, to those that we must improve or divest. In 2005, we allocated resources accordingly, while also maintaining our long-term commitment to preferentially invest in our higher-value downstream businesses.

## Technology Leadership

Dow is committed to creating innovative products that address world challenges and meet customer needs. From renewable

seed-oil raw materials that can partially replace hydrocarbons, to catalyst technologies that enable next-generation polymers, the Company is exploring an array of novel solutions focused on improving the lives and living standards of people across the globe. Using a business-driven approach to innovation, we are creating dynamic research models, increasing our intellectual property and reducing development costs. We are also targeting higher-value growth opportunities, bringing research and development (R&D) closer to our markets and customers and ensuring a more robust pipeline of in-demand products for the future.

## Growing with Strategic Customers

We aim to grow with our strategic customers by providing the products, technologies and services that enable them to advance in new directions. Toward that goal, we are developing stronger, more dynamic customer relationships that yield mutually beneficial opportunities for success. In 2005, such relationships enabled customers to deliver many breakthrough products and technologies – from leather-covered laptop computers to the world's largest desalination plant.

At the same time, we are advancing plans to create more market-facing businesses, aligning products and technologies with specific industries – such as automotive, building and construction, and personal care – to better serve the needs of our customers.

## Geographic Expansion

In 2005, we strengthened our market presence in several growth regions, most notably China and Russia, as well as countries like Brazil and India, and across various parts of Eastern Europe, Southeast Asia and the Middle East. For example, we became the first foreign-invested enterprise located in a free trade zone in China to receive approval to expand trading and distribution rights in the country. We received the go-ahead for a state-of-the-art R&D/information technology facility in Shanghai, China. And we gained approval for the construction of a STYROFOAM™ extruded polystyrene insulation board plant in Russia.



A black and white photograph of a woman with blonde hair, wearing safety glasses and a white lab coat, looking upwards. She is in a greenhouse, surrounded by large plants with long, pointed leaves. A white rectangular object is visible in the foreground. The background shows the structural frame of the greenhouse.

Dow's innovation activities  
are driven by business  
need, aligning R&D talent  
with specific markets and  
specific customers.

## one part action : financial performance

"Dow has a competitive position in pretty much every market, a broad global presence and an appropriate approach to future expansion. The management team is a key strength; they have a sound strategy and are sharply focused on investing shareholders' money on projects that will profitably grow the Company going forward."

Comment by a major institutional investor in response to the 2005 Rival Survey of the financial community

2005 was an outstanding year for Dow. Sales rose to a new high of \$46.3 billion, while net income increased to \$4.5 billion, 61 percent higher than in 2004 and more than one-and-a-half times the previous Company record.

Compared with 2004, earnings increased 58 percent to \$4.62 per share, and we significantly strengthened our balance sheet, reducing net debt by more than \$2.5 billion and lowering our ratio of net debt to capital from 41 percent at the end of 2004 to 29 percent at the end of 2005.

All of this was achieved despite continued high and volatile feedstock and energy costs, which soared by \$4 billion for the year.

This was a year that underscored the value of Dow's strategic direction.

Our Performance businesses reported exceptional earnings growth compared with 2004, outpacing strong gains in our Basics businesses, to end the year accounting for more than half of Dow's profits and highlighting the benefits of a diversified business portfolio.

The ebbs and flows of regional demand, most notably the first quarter softness in Asia Pacific and third quarter hurricane-related disruptions in North America,

were largely offset by relative strength in other parts of the world – demonstrating the merit of Dow's geographic balance.

Equity earnings from our non-consolidated affiliates added almost \$1 billion in earnings, once more validating our drive to grow the Company through strategic joint ventures.




And our commitment to financial discipline again played a critical part in the year's success. Capital spending was held significantly below the rate of depreciation at \$1.6 billion, while at the same time preserving the safety and the integrity of Dow's manufacturing facilities; and the Company's selling, administrative and research and development expenses as a percent of sales fell to just 5.7 percent.

During the year, we continued to drive portfolio management into every layer of the Company. We announced plans to shut down more than a dozen plants around the world, including several that were tied to the consolidation of existing operations or the start-up of new, more efficient facilities. In Europe, for example, Dow Automotive's Freienbach site in Switzerland will be shut down within the next two years as the business consolidates its urethanes, primers, structural adhesives and small packaging activities at Dow's Schkopau

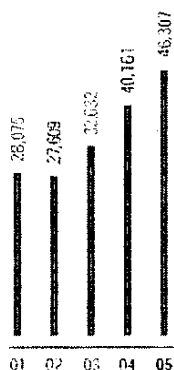
facility in Germany. And in the United States, the Company will build a Specialty Alkanolamines facility at its Plaquemine operations in Louisiana, replacing two older facilities in South Charleston, West Virginia, and Midland, Michigan.

Dow also divested a number of non-strategic or underperforming businesses during 2005, including its 50 percent interest in Cargill Dow L.L.C. and Union Carbide's 50 percent indirect interest in UOP L.L.C., a joint venture with Honeywell. And it dissolved the DuPont Dow Elastomers joint venture, exercising its option to acquire the ENGAGE™, NORDEL™ and TYRIN™ elastomers businesses from the enterprise.

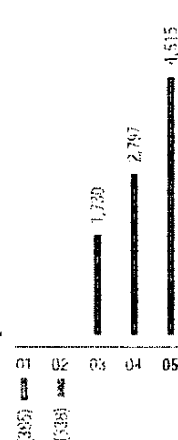
During the year ahead, we expect that worldwide demand for chemical and plastic products will continue to grow, led by Asia Pacific, Latin America and other emerging geographies, with solid contributions from North America and Europe. We will continue to focus on the implementation of our strategy, retaining our financial discipline and controlling the things we can control. As we have been saying for some time, we believe that 2006 will be an even better year for Dow than 2005.

	<h3>Expanding Our Presence</h3>	<h3>Managing Our Portfolio</h3>	<h3>Leading Our Industry</h3>	
				
	<p>In 2005, Dow once again increased both its sales and presence in Greater China, and announced plans to establish a state-of-the-art R&amp;D/information technology facility in Shanghai. Toward year end, the Company's Directors traveled to China for an extended Board meeting, affording them an important first-hand perspective on Dow's activities, the business environment and the culture in this critical region.</p>	<p>During 2005, Dow acquired full ownership of a number of its joint venture companies, and divested its interest in several others that were either under-performing or non-strategic. Associated with the dissolution of the DuPont Dow Elastomers joint venture, Dow exercised its option to acquire the ENGAGE<sup>®</sup>, TYRIN<sup>™</sup> and NORDEL<sup>™</sup> elastomers businesses – which supply materials for products ranging from car interiors to athletic footwear.</p>	<p>Dow's President, CEO and Chairman-Elect, Andrew Liveris, led the U.S. chemical industry's call for Congress to urgently address the widening gap between the country's natural gas demand and its available supply. Before the Senate Energy and Natural Resources Committee in October and later at a House Appropriations joint sub-committee hearing, he warned that restrictions on the nation's gas supplies threatened the viability of its entire manufacturing sector.</p>	

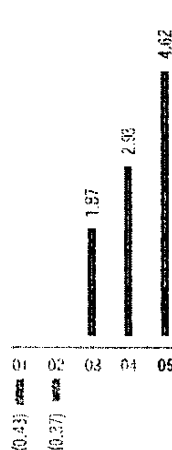
**NET SALES**  
(dollars in millions)



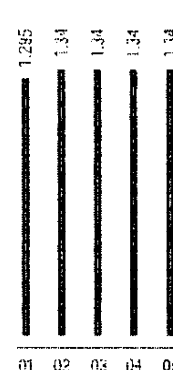
**NET INCOME (LOSS)**  
(dollars in millions)



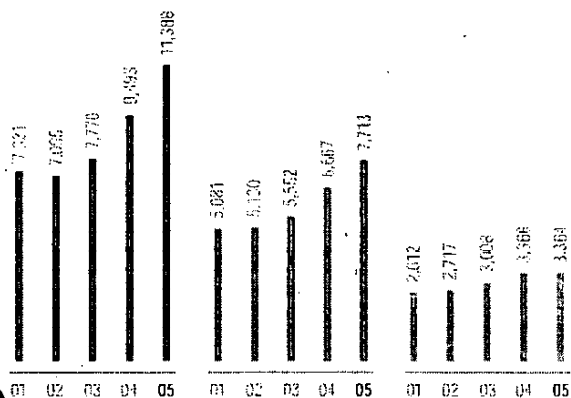
**EARNINGS (LOSS) PER SHARE – DILUTED**  
(dollars)



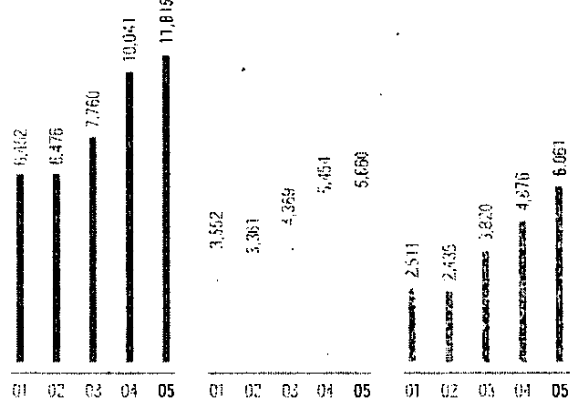
**DIVIDENDS DECLARED PER SHARE**  
(dollars)



**SALES FOR PERFORMANCE BUSINESSES**  
(dollars in millions)



**SALES FOR BASICS BUSINESSES**  
(dollars in millions)



■ Performance Plastics ■ Performance Chemicals ■ Agricultural Sciences

■ Plastics ■ Chemicals ■ Hydrocarbons and Energy

## one part action : environmental performance

"Dow's ability to integrate sustainable development into all of its business activities has enabled it to exceed a number of its aggressive 10-year environmental goals. This is exactly what it and other companies must do to ensure a future competitive advantage."

Björn Stigson, President  
World Business Council for Sustainable Development

The year marked the final chapter in our 2005 Environment, Health and Safety (EH&S) Goals program: a 10-year initiative focused on setting new standards of EH&S performance within the chemical industry. Although at the time of publishing this report not all of the year-end 2005 results are available, we know that we have met our targets in several areas, exceeded some, and come very close in most of the others. We are proud of our achievements over the past decade and are now focused on new, broader and more aggressive sustainability goals for 2015 with the aim of raising the bar of industry performance still higher. As the rest of the 2005 results become available, they will be reflected in our Corporate Report on Dow's website, [www.dow.com](http://www.dow.com).

During 2005, we made further progress in the area of employee safety, with the Company's injury and illness rate improving 20 percent compared with 2004. Since 1994, this rate has fallen by 84 percent – a tremendous achievement, but one that was sadly overshadowed in 2005 by three separate incidents leading to the deaths of three co-workers. These tragic incidents strengthen our resolve to continue to

infuse an employee mindset, a leadership attitude and a corporate culture that is committed to zero accidents, zero injuries and zero excuses.

Also during the year, Dow and the State Environmental Protection Administration of China launched a National Cleaner Production Pilot Project in the country, focused on reducing the environmental impact of the country's industrial activities. Dow will contribute both funding and technical know-how to the project.

In the same vein, the Company also signed a letter of intent with China's State Administration of Work Safety for a joint, national demonstration project on the safe management of hazardous chemicals.

On the other side of the world, Dow's new Energy Optimization Technology has significantly improved efficiency at sites in Texas, U.S.A. The technology enables Dow to determine exactly how much energy is needed to run its plant at any given time, meet demand with the most economical energy source and stay within site emissions constraints – thereby minimizing waste, saving energy and reducing costs.

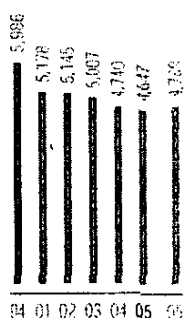
In Europe, SAFECHEM, a Dow subsidiary, launched a chemical leasing pilot project for metal cleaning applications in the automotive industry. After eight months, solvent emissions had been cut by more than 60 percent.

And also in Europe, the Company announced a third professorship in Sustainable Development at the University of Zaragoza in Spain. Dow also sponsors a Chair of Sustainable Development at the Wittenberg Center for Global Ethics in Germany and the University of Michigan in the United States.

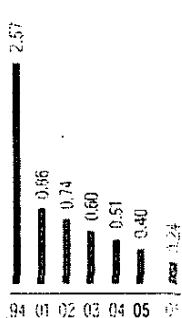
During the year, we once again received guidance from our Corporate Environmental Advisory Council, a panel of 10 external stakeholders whose knowledge, experience and understanding provide critical counsel to Dow on environment, health, safety and sustainability issues. For example, the Council, which is now in its 15<sup>th</sup> year, played an integral role in helping Dow develop its 2015 goals, and offered important insight on a number of key corporate, business and stakeholder-related matters.

	<p><b>The Power is in Your Hands™ Campaign</b></p>	<p><b>Ocean Futures Society</b></p>	<p><b>2005 Children's Eco Club</b></p>	
				
	<p>In the United States, Dow is a co-sponsor of the Alliance to Save Energy's "The Power is in Your Hands" campaign. The campaign's aim is to reduce energy consumption in the United States by providing U.S. consumers with the information and the tools they need to save energy, helping address the widening gap between energy supply and demand. Visit the campaign's web site at: <a href="http://www.powerisinyourhands.org">www.powerisinyourhands.org</a>.</p>	<p>Dow formed an alliance with Jean-Michel Cousteau's non-profit organization, Ocean Futures Society (OFS), to explore sustainable solutions to marine challenges through technology and education. The alliance's first project is an inspirational, six-part television series, Jean-Michel Cousteau: Ocean Adventures, which infuses thrilling underwater adventure with messages about ecology, highlighting the oceans' critical importance to life on earth.</p>	<p>Dow supported the 2005 Children's Eco Club, an event hosted by the Ministry of Environment of Japan to raise awareness among schoolchildren and young adults about the importance of environmental protection. As well as displaying a prototype wind/solar hybrid generator, Dow also used a traditional fishing game made of STYROFOAM® insulation board to attract crowds to learn more about the benefits of energy conservation.</p>	

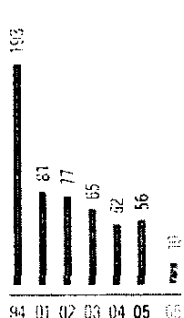
**ENERGY INTENSITY**  
(BTUs per pound of production)



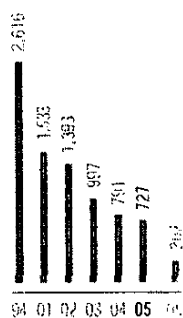
**INJURY AND ILLNESS**  
(recordable incidents/  
1,000,000 work hours)



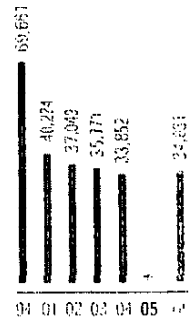
**PROCESS SAFETY**  
(number of incidents)



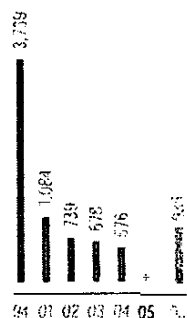
**LEAKS, BREAKS  
AND SPILLS**  
(number of incidents)



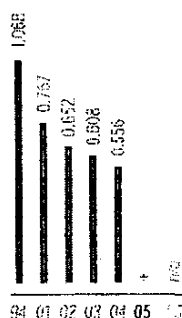
**CHEMICAL  
EMISSIONS**  
(tons)



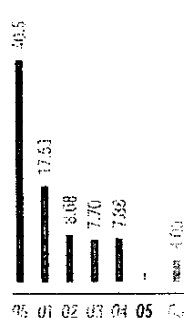
**EMISSIONS OF  
PRIORITY COMPOUNDS**  
(tons)



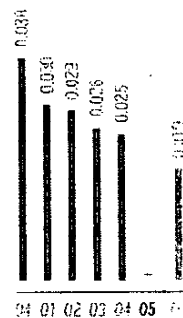
**GREENHOUSE GAS  
INTENSITY**  
(CO<sub>2</sub> equivalents per  
pound of production)



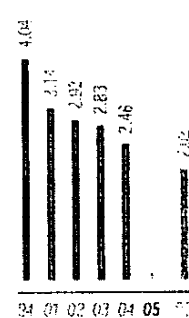
**DIOXIN EMISSIONS  
TO AIR AND WATER**  
(grams per year -  
toxic equivalents)



**WASTE**  
(pounds per pound  
of production)



**WASTE WATER**  
(pounds per pound  
of production)



■ Baseline ■ Goal

\* Year-end 2005 data not yet available. Please visit the Corporate Report on Dow's website ([www.dow.com](http://www.dow.com)) for updated figures.

Note: Our historic production data takes into account any disclosures, mergers and acquisitions and may change from year to year to the extent that we adjust such activities. Our energy use, waste and waste water data will also be affected.

## one part action : social responsibility

"Having seen their work, I have been impressed by the dedication and competence demonstrated by Dow employees in preparing for the hurricanes, the recovery efforts afterward and especially their ongoing assistance to others."

U.S. Senator Pete Domenici of New Mexico  
Senate Energy and Natural Resources Committee Chairman

Dow's commitment to social responsibility embraces not only our employees and the communities in which we operate, but also our retirees, the end-users of our products and the governments and municipalities that benefit from our presence. Once again in 2005, we worked hard to understand the expectations of each of those groups, to deliver on those expectations wherever possible and to respond respectfully to their specific concerns and issues.

Global charitable contributions in 2005 were \$17.5 million, with an additional \$5.7 million spent out of the total \$8.6 million pledged by the Company to support relief efforts in the wake of the Southeast Asian tsunami, U.S. hurricanes Rita and Katrina, and the earthquake in Pakistan. This represents a total of \$23.2 million, around one-third higher than in 2004.

In the wake of hurricane Katrina, Dow employees from across the world responded swiftly and selflessly to the plight of their colleagues and the communities left devastated by the storm's brutality. While the Company set about ensuring the safety and well-being of affected employees and their families, Dow people gave readily of their time, their money and their hospitality to support those who were impacted by

the disaster. And in Indonesia's Banda Aceh province, Dow continued its 20-plus year relationship with Habitat for Humanity by providing the materials, funds and labor to help build and furnish new homes for nearly 200 families in Emporem Village, with employees from Indonesia, Singapore and Malaysia joining in the construction effort. This was just one of many projects supported by the Company across south-east Asia, as the region set about the task of rebuilding thousands of communities that had been devastated by the tsunami.




During the year, we continued to focus on employee health. For example, in 2005 our health services team completed a survey to assess the health of employees across the globe. From this information, the team will now be able to identify and prioritize the most effective programs and services to meet the specific needs of employees; identify trends in their health status; and evaluate the effectiveness of health programs and services.

We also made a number of inroads on the public health front. We launched ADSORBSIA™, an advanced, titanium-based product that removes arsenic and will help municipalities safeguard drinking water in communities around the world. We also introduced GLUTEX™ sanitizers

and antimicrobials, proven by external testing laboratories to be effective against the highly pathogenic H5N1 Avian Influenza strain.

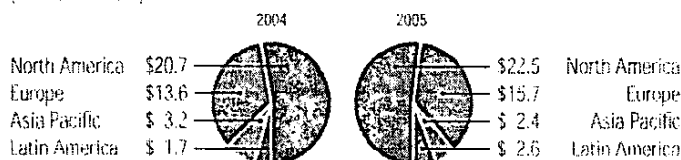
In the ongoing fight against cancer, we entered an agreement with Cytogen Corporation, a biopharmaceutical company, to further develop a proprietary Dow technology to help create a targeted oncology product for the treatment of prostate and other cancers. And we entered a joint development agreement with DOR BioPharma, Inc., to advance the development of its proprietary vaccine to protect against botulism poisoning, a top bioterrorism threat.

2005 also saw the release of research studies indicating that the addition of METHOCEL™ dietary fiber to a high-fat diet might slow fat absorption and reduce the development of insulin resistance – a precursor to Type II diabetes. Dow plans further research to corroborate this exciting finding. And dietary guidelines issued by the U.S. government prompted food manufacturers, restaurant owners and consumers to replace hydrogenated oils with trans-fat-free oils, such as NATREON™ canola and sunflower oils from Dow AgroSciences.

	Improving Education	Rebuilding Communities	Promoting Fitness
	 <p>At the Jose Maria Cordoba School, close to Dow's Cartagena site in Colombia, 10 Dow employees are involved in a program to improve the school's educational processes. The "Businesses for Education" initiative involves each employee dedicating two hours a week for two years, helping the school's administrative staff in areas such as communication, conflict management, strategic planning and leadership.</p>	 <p>Stella Tancoos was one of the many people from Dow's Louisiana operations site who volunteered their time to help rebuild their communities in the aftermath of hurricanes Katrina and Rita. Stella spent many hours at the LSU Agricultural Center, helping to care for hundreds of pets rescued from New Orleans and Southwest Louisiana, until they could be reunited with their owners – or found new homes.</p>	 <p>In central Germany, Dow was the principal sponsor of a 9.3 km junior bike race that took place close to its Biehlen facility, attracting more than 15,000 cycling enthusiasts from across the country. This was one of scores of events supported by Dow around the world in 2005 focused on encouraging young people to take part in sports and other recreational activities.</p>

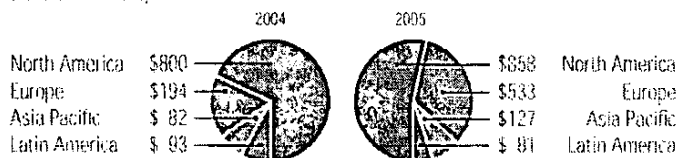
#### PURCHASES BY GEOGRAPHIC AREA

(Dollars in billions)



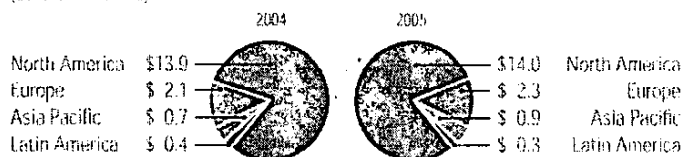
#### TAXES PAID BY GEOGRAPHIC AREA

(dollars in millions)



#### CHARITABLE CONTRIBUTIONS BY GEOGRAPHIC AREA\*

(dollars in millions)



#### EMPLOYEES BY GEOGRAPHIC AREA

	01	02	03	04	05
Total Employees	52,700	50,000	46,400	43,200	42,400
North America	54%	55%	55%	54%	53%
Europe	32%	31%	30%	31%	31%
Latin America	8%	8%	8%	8%	9%
Asia Pacific	6%	6%	7%	7%	7%
Male Employees	76%	76%	76%	76%	76%
Female Employees	24%	24%	24%	24%	24%

#### COMMUNITY ACCEPTANCE SCORES

Site	Goal <sup>(1)</sup>	Survey Score <sup>(2)</sup>
Altona, Australia	60	63 (1999)
Aralu, Brazil	60	71 (2001)
Bahia Blanca, Argentina	60	48 (2000)
Dow Olefinverbund GmbH, Germany	80	77 (2003)
Cartagena, Colombia	60	67 (2001)
Druseheim, France	60	69 (2002)
Fort Saskatchewan, Canada	80	84 (2003)
Fresport, U.S.A.	80	84 (2004)
Guarujá, Brazil	60	75 (2001)
Jundiaí, Brazil	60	89 (2001)
King's Lynn, U.K.	60	74 (2002)
Midland, U.S.A.	80	80 (2001)
Plaquemine, U.S.A.	80	79 (2005)
Prentiss, Canada	60	69 (2003)
Rheinfelden, Germany	60	74 (2002)
San Lorenzo, Argentina	60	63 (2003)
Sarnia, Canada	60	71 (2003)
Seadrift, U.S.A.	80	88 (2004)
Stade, Germany	80	77 (2002)
St. Charles Operations, U.S.A.	80	75 (2004)
Tarragona, Spain	60	62 (2004)
Terneuzen, The Netherlands	80	86 (2002)
Texas City, U.S.A.	80	87 (2001)
West Virginia, U.S.A.	80	84 (2002)

\* Does not include various donations, totaling \$6.7 million (out of a total \$8.6 million pledge) to support disaster relief efforts during 2005.

Does not include \$100 million donated to the Dow Chemical Company Foundation in the fourth quarter 2005.

<sup>(1)</sup> Favorability goals are based on an evaluation of the individual site's business importance and impact on the local community.

<sup>(2)</sup> Most recent score and year in which survey was conducted.

## **SECTION THREE**

### **Standard Permit Application Part II Supplementary Information**

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#### **ATTACHMENT K**

#### **AGENCY LETTERS FOR ENVIRONMENTAL CHARACTERISTICS**



**ANGUS**

ANGUS Chemical Company  
 A Subsidiary of The Dow Chemical Company  
 350 Louisiana Highway 2  
 P.O. Box 1325  
 Sterlington, LA 71280  
 USA March 8, 2006

Date: 8/30/07

No known archaeological sites or historic properties will be affected by this undertaking. This effect determination could change should new information come to our attention.

Pam Breaux: Pam Breaux  
 State Historic Preservation Officer

CERTIFIED MAIL - Return Receipt Requested

JWS # 33-06B

Jonathan Fricker, Director  
 Louisiana Department of Culture, Recreation and Tourism  
 Office of Cultural Development  
 Division of Historic Preservation  
 PO Box 44247  
 Baton Rouge, Louisiana 70804

Re: Request for Cultural Resources Data  
 ANGUS Chemical Company  
 Existing Wastewater Treatment Plant (located 3 miles SW of Sterlington)  
 Sterlington, Ouachita Parish, Louisiana  
 (LDEQ AI 1556, FIDN GD-073-0334, PER19940003)

Dear Mr. Fricker:

The ANGUS Chemical Company, Sterlington Plant requests a review of its wastewater treatment plant location and whether or not any known cultural resources exist within 1000 feet of the facility property. This request is part of the Louisiana Department of Environmental Quality's (LDEQ) solid waste permit renewal process for our wastewater treatment plant. Our wastewater treatment plant is located approximately three (3) miles southwest of the City of Sterlington. An area map is enclosed to facilitate your review of its location. In order to meet LDEQ timelines, we request an expeditious reply.

We look forward to receiving the Department's opinion on this matter. If additional information is required please contact John Sutton at (318) 665-5353 or [jwsutton@dow.com](mailto:jwsutton@dow.com). Our FAX is (318) 665-5296. Thanks in advance for your assistance.

Sincerely,

ANGUS Chemical Company

Patrick F. Normand  
 Patrick F. Normand  
 Responsible Care Leader

Enclosure

PHK-28-2006 16:31

ANGUS CHEMICALS

318 665 5296 P.03/06

Rec'd  
3/27/06  
TAN

## State of Louisiana

DWIGHT LANDRENEAU  
SECRETARYDEPARTMENT OF WILDLIFE & FISHERIES  
POST OFFICE BOX 98000  
BATON ROUGE, LA 70898-9000  
(225) 765-2800KATHLEEN BABINEAUX BLANCO  
GOVERNOR

**Date** March 21, 2006

**Name** Patrick F. Normand

**Company** Angus Chemical

**Street Address** P.O. Box 1325

**City, State, Zip** Sterlington, LA 71280

**Project** Waste Water Renewal Permit, Sterlington, Ouachita Parish, LA

**Invoice Number** 06032101

Personnel of the Habitat Section of the Fur and Refuge Division have reviewed the preliminary data for the captioned project. After careful review of our database, no impacts to rare, threatened, or endangered species or critical habitats are anticipated for the proposed project. No state or federal parks, wildlife refuges, scenic streams, or wildlife management areas are known at the specified site within Louisiana's boundaries.

The crystal darter (*Crystallaria asprella*) may be found in water bodies near the project area. It is considered rare in the state of Louisiana and is vulnerable to siltation and other forms of pollution from urbanization, strip-mining, logging, natural gas exploration, and improper agricultural practices as well as stream alteration projects, such as damming, dredging, and channelization. Its distribution has decreased dramatically in the last century and has been extirpated from many states. It prefers clean swept substrate consisting of a mixture of sand and fine gravel. Beneficial management practices include those that limit and/or control activities such as stream channelization, impoundment, removal of riparian vegetation, and careless agricultural practices.

The Paddlefish (*Polyodon spathula*) occurs in water bodies near the project area. This fish is considered rare in Louisiana and possession of this species is prohibited by the LA Department of Wildlife and Fisheries. The paddlefish is threatened by siltation of spawning habitat, pollution, back-to-back impoundments, and in some areas, exploitation by the caviar industry. Habitat destruction and river modification are the most obvious changes affecting abundance and distribution. We advise you to take the necessary measures in order to avoid any degradation of water quality of streams/canals. If you have any questions, please contact LNHP 225-765-2823.

The Louisiana Natural Heritage Program has compiled data on rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features throughout the state of Louisiana. Heritage reports summarize the existing information known at the time of the request regarding the location in question. The quantity and quality of data collected by the LNHP are dependent on the research and observations of many individuals. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Louisiana have not been surveyed. This report does not address the occurrence of wetlands at the site in question. Heritage reports should not be considered final statements on the biological elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The Louisiana Natural Heritage Program requires that this office be

MAR-28-2006 16:31

ANGUS CHEMICALS

318 665 5296 P.04/06

acknowledged in all reports as the source of all data provided here. If you have any questions or need additional information, please call Louisiana Natural Heritage Program at 225-765-2357.

Sincerely,

  
S/ Gary Lester, Coordinator  
Natural Heritage Program



# DEPARTMENT OF THE ARMY

VICKSBURG DISTRICT, CORPS OF ENGINEERS

4155 CLAY STREET

VICKSBURG, MISSISSIPPI 39183-3435

*Rec'd  
6/09/06  
RFN*

REPLY TO  
ATTENTION OF:

June 2, 2006

Operations Division  
Regulatory

SUBJECT: Department of the Army Regulatory Requirements - ANGUS  
Chemical Company, Existing Wastewater Treatment Facility,  
Sterlington, Ouachita Parish, Louisiana

Mr. Patrick F. Normand  
ANGUS Chemical Company  
Post Office Box 1325  
Sterlington, Louisiana 71280

Dear Mr. Normand:

This is in response to your letter requesting a jurisdictional determination on an existing solid waste disposal facility. The facility is owned by ANGUS Chemical Company and is located approximately 3 miles southwest of Sterlington, Louisiana. Included in the reviewed area is a surrounding 1,000-foot wide buffer zone. This activity is located in sections 1, 2, 38, 39, 40, and 45, T19N-R3E, Ouachita Parish, Louisiana. The project location is depicted on the enclosed map (enclosure 1).

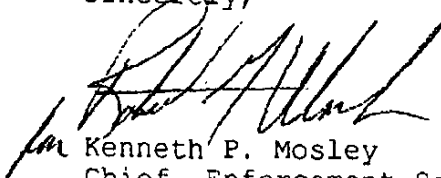
Based upon the information provided, it appears there are jurisdictional areas on the property subject to regulation pursuant to Section 404 of the Clean Water Act. The approximate extent of wetlands within the boundary of the property described in your letter is depicted on the enclosed preliminary map (enclosure 2). Any work involving the discharge of dredged or fill material (land clearing, ditching, filling, leveeing, etc.) within the limits of the jurisdictional areas identified will require a Department of the Army Section 404 permit prior to beginning work. Please note that this jurisdictional determination is preliminary and should be used for planning purposes only. A final determination of permit requirements will be made upon your submission of a completed application, with project plans. I have enclosed a copy of an appeals form (enclosure 3).

-2-

For your convenience, I am enclosing a Department of the Army permit application package with instructions (enclosure 4). Your application for any proposed work in wetlands or other waters of the United States should be submitted at least 120 days in advance of the proposed starting date. To expedite the evaluation process, please refer to No. MVK-2006-432 when submitting the application.

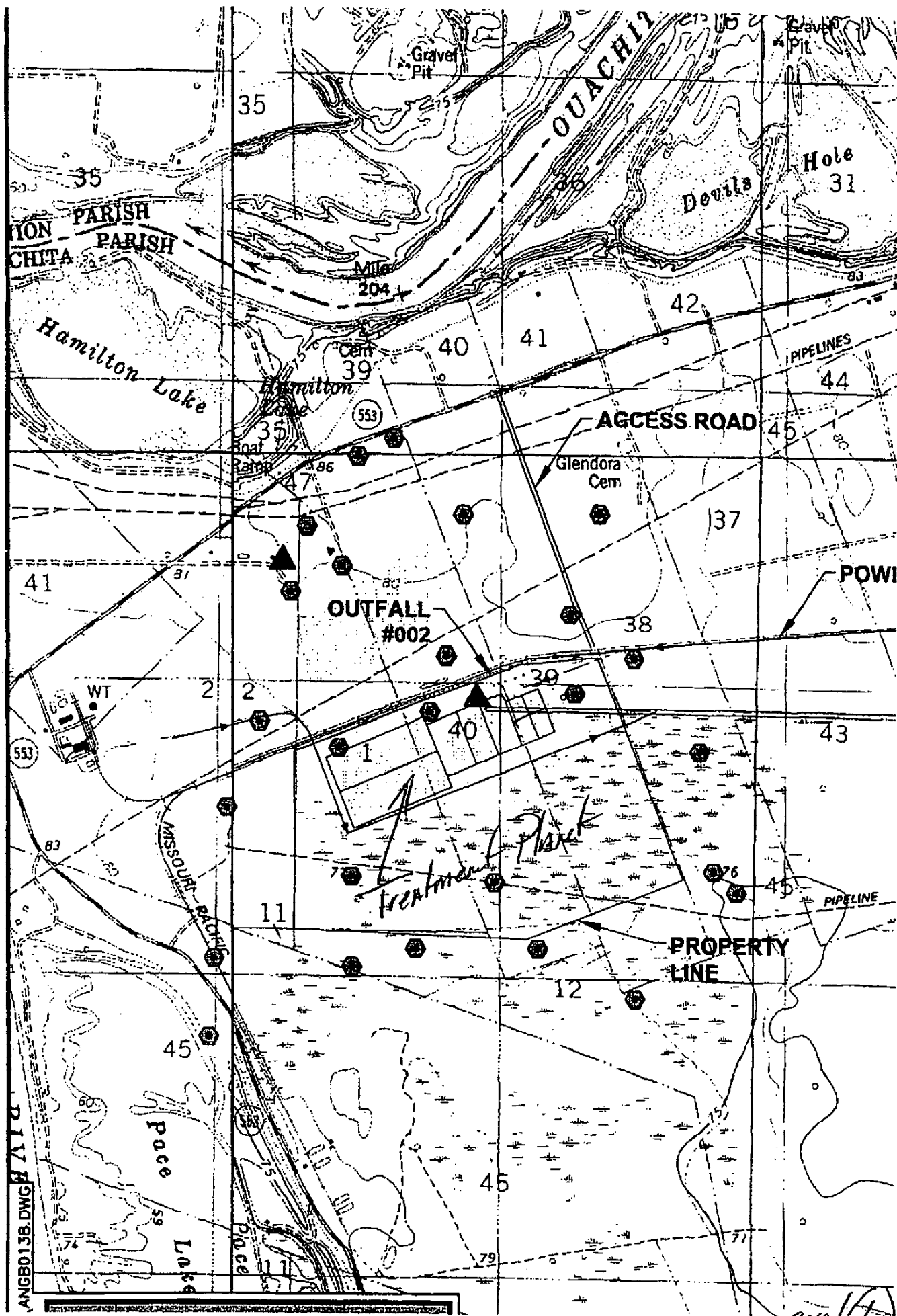
If you have any questions, please contact Mr. Robert Ulmer of this office, telephone (601) 631-5637, fax (601) 631-5459 or e-mail address: Robert.G.Ulmer@mvk02.usace.army.mil.

Sincerely,

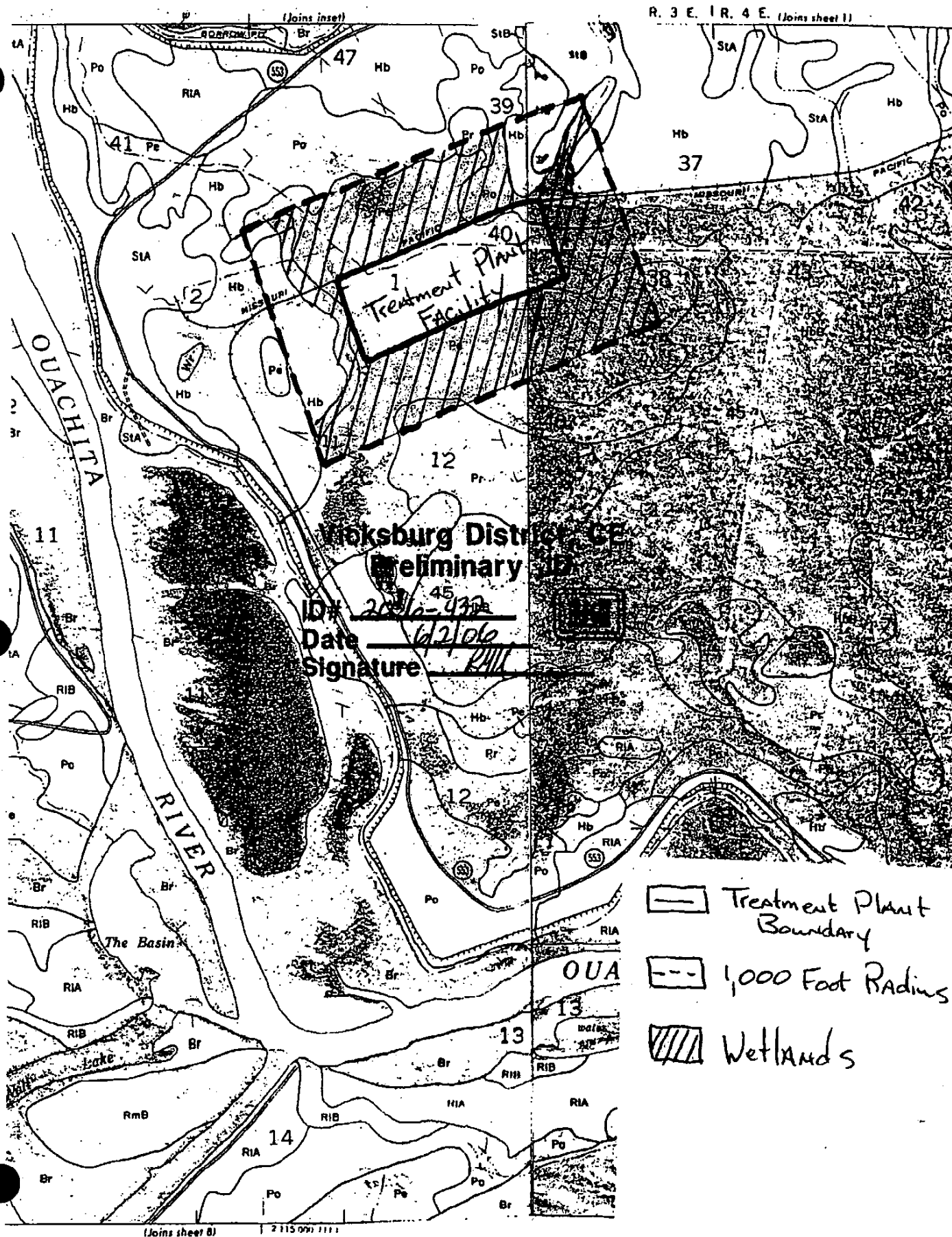
A handwritten signature in dark ink, appearing to read "Ken Mosley", is written over a horizontal line.

for Kenneth P. Mosley  
Chief, Enforcement Section  
Regulatory Branch

Enclosures



BEST COPY



PNC1(2)



## **SECTION THREE**

### **Standard Permit Application Part II Supplementary Information**

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#### **ATTACHMENT L**

#### **MONITORING WELL PLUGGING AND ABANDONMENT AND INSTALLATION**

**ANGUS Chemical Company**

A Subsidiary of The Dow Chemical Company  
350 Louisiana Highway 2  
P.O. Box 1325  
Sterlington, LA 71280  
USA



September 18, 2006

**HAND DELIVERED**

JWS-112-06

Mr. Bijan Sharafkhani, P.E.  
Administrator  
Waste Permits Division  
Office of Environmental Services  
Louisiana Department of Environmental Quality  
P.O. Box 4313  
Baton Rouge, Louisiana 70821-4313

RE: Notice of Deficiencies for Permit Renewal Application  
Technical Review #2  
ANGUS Chemical Company  
GD-073-0334/P-0067  
Agency Interest #1556/ PER 19940003  
Ouachita Parish

6 SEP 20 11:11

LDEQ RECEIPT

Dear Mr. Sharafkhani:


Please see the enclosed five (5) hard copies and (1) electronic CD-ROM copy of the response to the Louisiana Department of Environmental Quality's (LDEQ) Notice of Deficiencies (NODs), Technical Review #2 for the permit renewal application for the ANGUS Chemical Company's (ANGUS) Wastewater Treatment Plant. A renewal permit application was originally submitted January 26, 1994 to the LDEQ. ANGUS received NODs from the LDEQ on January 4, 2006, and submitted an updated permit application in response to those NODs on April 5, 2006. A second technical review was performed by LDEQ, and additional NODs were submitted in a June 16, 2006 letter to ANGUS. This submittal addresses NODs issued in the June 16, 2006 letter.

ANGUS Chemical and LDEQ met on July 14, 2006 to discuss the NODs. ANGUS submitted a request to extend the deadline to submit a response to the NODs in a July 17, 2006 letter. In a July 19, 2006 letter, LDEQ granted the extension, and set a due date for the response by September 21, 2006. Additionally, in the meeting, ANGUS indicated that its response would include only applicable sections of the application that were updated to address the NOD's. This submittal was designed to conveniently replace existing sections in the updated application submitted on April 5, 2006.

If you have any questions concerning this submittal, please contact John Sutton at (318) 665-5353 or [jwsutton@dow.com](mailto:jwsutton@dow.com).

Sincerely,

**ANGUS Chemical Company**

  
Pat F. Normand  
Responsible Care Leader

Enclosure

Cc: Cara Zordan, LDEQ

**GROUNDWATER MONITORING WELL INSTALLATION PLAN  
FOR  
ANGUS WASTEWATER TREATMENT PLANT  
ANGUS CHEMICAL COMPANY  
STERLINGTON, LOUISIANA**

The Solid Waste Permit Application for the ANGUS Chemical Company Wastewater Treatment Plant, submitted to the Louisiana Department of Environmental Quality (LDEQ) and dated January 26, 1994, contained a request to discontinue groundwater monitoring at well A-11. ANGUS also requested approval to install three (3) additional monitoring wells at the plant. In a December 22, 2005, the LDEQ agreed that monitoring well A-11 may be discontinued, and that a separate modification request should be provided to be incorporated into the renewed permit.

ANGUS would like to discontinue monitoring well A-11. ANGUS will plug and abandon well A-11. Accordingly, ANGUS would like to install two additional groundwater monitoring wells, instead of three (3) as originally proposed. Figure 1 shows the approximate location of the proposed groundwater monitoring wells. The location of the proposed two (2) wells was preliminary approved during a meeting held with LDEQ on July 14, 2006. There are currently five (5) groundwater monitoring wells installed at the site. The installation of additional groundwater monitoring wells will provide enough wells located hydraulically down-gradient to yield samples that are representative of the groundwater passing the relevant point of compliance.

All well plugging and abandonment and well installation activities will be completed as outlined within the "Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook, December 2000" (Handbook) prepared by the LDEQ and LDOTD.

**PLUGGING AND ABANDONING WELL A-11**

Plugging and abandonment activities will occur by initially removing any surface completion and guard posts. The remaining well casing will then be cut off down to 2 feet below ground surface. The well casing will then be grouted by the tremie method utilizing a cement-bentonite mixture of 5% to ground surface. All soil cuttings will be containerized and disposed of at a certified solid waste landfill.

## **WELL INSTALLATION**

Monitoring wells will be installed using hollow stem auger or mud rotary drilling techniques. Monitoring well installation, completion, and development will be performed in accordance with SOP 1.

Well locations will be staked and utilities cleared prior to commencing drilling activities as specified in SOP 2. All drilling and sampling equipment will be decontaminated, as specified in SOP 3. All waste generated during field activities will be handled according to state and federal regulations (SOP 4). After all installation is completed, the monitoring wells will be surveyed, as specified by SOP 5.

## **WELL CONSTRUCTION**

The depth of the proposed monitoring wells will be determined in the field based on the depth of the uppermost aquifer. It is anticipated that the total depth of the three (3) monitoring wells will be no greater than 70 feet below ground surface.

The monitoring wells will be constructed of 2-inch diameter PVC with 10 feet of 0.010-inch slotted screen with a 1 foot sump below the screen. In accordance with LDEQ and LDOTD standards, the annular space of each borehole will be 8.25-inch diameter. The wells will be completed at the surface with a 3 foot x 3 foot concrete pad, 6-inch steel outer protective casing and four 2-inch diameter steel guard posts. The outer protective casing and posts will be painted with high visibility enamel paint.

The standard operating procedures for monitoring well installation and required documentation (including well registration) are discussed in Sections 1 through 8 of the "Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook, December 2000" (Handbook) prepared by the LDEQ and LDOTD. These procedures will be followed during installation activities.

Prior to project commencement, all URS and subcontract personnel involved in well installation must individually read and then discuss as a group the procedures detailed in the SOPs. The field task leader will observe the entire well installation to ensure that procedures are completed in accordance with SOPs.

Well development may begin on a monitoring well after the concrete well pad has cured for 24 hours. Well development will be performed using a bailer or downhole submersible pump.

The volume of water within the well casing and the filter pack will be calculated and a minimum of five volumes will be removed or until the well is dry. Water quality parameters (pH, specific conductance, temperature and turbidity) will be recorded after each well volume is removed. After five volumes are removed and pH, specific conductance and temperature have stabilized and turbidity is below 50 nephelometric turbidity units (NTUs), development is complete. If stabilization has not occurred or turbidity remains above 50 NTUs, the field task leader will determine if further development is required. The above procedure is described in detail in SOP 6.

# SOP ONE

## Monitoring Well Installation

### 1.1 OBJECTIVE

Monitoring wells will be installed to collect analytical groundwater samples and water level data. This SOP contains specific details about the procedures and equipment necessary to properly install and develop monitoring wells.

The following well construction procedures will provide consistent and high quality groundwater samples and are in accordance with procedures for sample collection as detailed in the following documents:

EPA, 2001, *Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual (SOPQAM)*, U.S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

LDEQ and LDOTD, 2000, *Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook*. LDEQ, Groundwater Protection Division, and LDOTD, Water Resources Section, Baton Rouge, Louisiana.

U.S. Army Corps of Engineers, February 2001, *Requirements for the Preparation of Sampling and Analysis Plans*, Engineer Manual EM 200-13.

### 1.2 EQUIPMENT AND MATERIALS

- Logbooks;
- Subcontractor equipment (i.e., Type II Portland cement, bentonite powder, bentonite pellets, potable water, steam cleaner, well construction materials, drill rig, associated equipment capable of drilling, sampling and completing wells to the desired depth and all other necessary equipment and supplies);
- Well diagram sheets;
- Bailers or pumps;
- Boring logs;
- Well development logs;
- Rope;
- Surveying equipment (supplied by subcontractor);
- Survey forms;
- Electronic water level indicator;
- Weighted tapes;

## SOP ONE

## Monitoring Well Installation

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- Drums or other containers;
- Well schematic with detailed construction information;
- Decontamination equipment as specified in SOP A6; and
- Health and Safety Equipment as specified in the project HASP.

### 1.3 METHODOLOGY

1. Monitoring well construction diagrams (Attachment 1-1) will be used to record data regarding the construction of each well including the project name, well identification, type of screen and casing material, slot size of screen, elevation of screened interval [in reference to mean sea level (msl)], depth of installation (to  $\pm 1$  foot msl), type of bottom plug, date of installation, well diameter, surface elevation (in reference to msl), name of geologist and driller responsible for installation, materials and thickness of filter pack and annular sealant, surface seal construction, type of protective casing and cap, and groundwater elevation in the well ( $\pm 0.1$  foot msl).

Stratigraphic interpretations will be recorded on a soil boring log (SOP 6) during the installation of the boring for each well. Monitoring well construction logs will be completed following well construction and elevation surveys.

2. Each new well installed will consist of schedule 40 polyvinyl chloride (PVC) casing with ten feet of schedule 40 PVC screen. However, the types of contaminants which may be present at proposed well completion locations may dictate that other types of material (e.g., stainless steel) be used.
3. Verify that the appropriate supplies for monitoring well installation are present on-site and that sufficient containers (drums, etc.) are present to temporarily store all material generated during well completion and development (SOP 6).
4. If surface casing is used as part of the monitoring well installation, the diameter of the surface casing will allow a 3-inch minimum annular space between the monitoring well casing and the inside diameter (I.D.) of the surface casing. The following are some surface casing specifics:
  - Surface casing material may consist of either steel or PVC;



## SOP ONE

## Monitoring Well Installation

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- The boring will be advanced to the desired depth at a diameter greater than the outside diameter (O.D.) of the surface casing;
  - The bottom end of the surface casing will be sealed with an inert drillable end plug;
  - The surface casing may then be lowered to the bottom of the borehole;
  - Cement/bentonite grout will be trimmed into the annular space and the grout weighed by a mud balance and recorded; and
  - After 24 hours the borehole may be re-entered through the surface casing, the end plug drilled out, and sampling below the surface casing may begin.
5. Before installation, if printing inks are present they will be removed from the well screens and riser pipes. It is often necessary to use sandpaper to accomplish this. Removal of the printing inks must be followed by the decontamination (steam cleaning). However, some casing materials are cleaned by the manufacturer and shipped in sealed plastic bags. Cleaning of these materials may not be necessary prior to installation.
6. Each monitoring well will be installed either through augers, sonic casing, or in the center of the borehole. At a minimum, a 3-inch annular space must remain after placement of the screen and casing. Before placement of the screen and casing, the borehole depth should be verified with a weighted measuring tape.

The selection of appropriate sand size will be based on the natural formation grain size. A sand filter pack will be trimmed into the annulus between the well casing and borehole wall. While the sand is being trimmed, checks for well alignment will be made to ensure that the well is centered in the borehole.

If using HSA, the augers will be slowly removed as the sand pack is trimmed until the bottom of the lead auger is just above the top of the sand pack. The depth from ground surface to the top of the sand pack will be checked with a weighted tape before adding the bentonite seal. The sand pack will extend a

## **SOP ONE**

## **Monitoring Well Installation**

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minimum of 2 feet above the top of the well screen where feasible. The bentonite seal will be 3 feet thick where practical and installed at the level specified in the SAP.

In cases of flowing sands, potable water may be added to the inside of the augers in order to prevent sand from coming up inside the augers. The amount of water added should be measured and recorded.

If using HSA, the remaining augers will be removed during the installation of the bentonite seal. The bentonite pellets will be allowed to hydrate for 4 hours and bentonite chips/granules will be allowed to hydrate for 2 hours before adding a cement/bentonite grout seal into the remaining annulus of each well.

Cement/bentonite grout for permanent monitoring wells will consist of Portland cement and powdered sodium bentonite. The mixing of the grout will continue until a smooth, lump free consistency is achieved. A typical 5 percent cement/bentonite grout would contain one sack Portland type I cement (94 lbs) mixed with five pounds of sodium bentonite and 8.5 gallons of water. This creates a slurry weighing approximately 13.8 lbs/gal.

Grout for temporary monitoring wells will consist of a high solids bentonite (Volclay®) grout composed of 90% sodium montmorillonite clays. This material is specifically designed for grouting well annuli.

The grout mixture will be pumped through a rigid, side discharge tremie pipe placed approximately six inches above the bentonite seal. No drill stem or flexible hose will be used for grouting. All cement/bentonite grout will be placed by a commercially available pump specifically designed and manufactured to pump grout materials. The grout mixture will be pumped until undiluted grout flows from the annulus at the ground surface.

After a minimum of 12 hours, the well will be inspected for settlement of the grout and more grout added as needed. The amount of additional grout will be entered on the well construction log.

## SOP ONE

## Monitoring Well Installation

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All wells installed at a particular facility will be secured with a cap and identically keyed locks. The keys will be maintained by contractor personnel, the client, and property owners, if necessary.

7. The riser pipe for the above-ground well installations will extend a minimum of 2.5 feet above the ground surface. A "V" notch will be made at the top of the PVC riser pipe and will be used as a reference point for water level measurements. A steel outer protective casing equipped with a hinged locking cap will be installed while the surface pad is being poured. The pouring of the pad cannot occur until the grout seal has cured for a minimum of 24 hours. The protective casing is then pushed at least 2 feet into the ground. The remainder of the form for the pad will be filled with concrete. The pad will be a minimum of 3 feet x 3 feet x 4 inches thick.

Cement/bentonite grout should then be added to the space between the well casing and the protective casing until the level of the grout inside the protective casing is at or above the surface concrete pad. After the grout has cured, a hole will be drilled into the protective casing immediately above the grout surface and a threaded plug will be installed. These weep holes will be a minimum of 1/4-inch diameter to allow the drainage of water which may accumulate inside the protective casing.

Four above ground protective posts will be installed. These posts will be made from 3- to 4-inch diameter steel pipes, extend at least 2 feet into a concrete footing and at least 3 feet above the ground surface, and be filled with concrete for additional strength.

8. All monitoring wells will be developed to remove fine-grained sediment and sediment that may have accumulated inside the screen as a result of formation disturbance during drilling. If well development does not occur before the concrete pad is poured, development must not begin until the concrete surface pad has cured at least 24 hours. Well development will continue until specific conductance and/or pH measurements approach a constant value and can be reproduced after 24 hours. All purge water will be captured and containerized by the drilling contractor.

## SOP ONE

## Monitoring Well Installation

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Before development of each well, a PID/FID reading will be taken immediately after opening the well cap. Total well depth and depth to the top of the water table will be measured. Measurements will be recorded from the "V" notch reference point. Development will be conducted by bailing, surging, and/or pumping each well. The volume of water within the well will be calculated and a minimum of 5 volumes will be purged, or the well purged dry. A PID/FID reading will be taken immediately after opening the well cap. The pH, specific conductivity, temperature, and turbidity of the purged water will be measured and recorded after each volume has been purged. After the minimum of 5 volumes of water has been purged and pH, specific conductivity and temperature parameters have essentially stabilized, and turbidity is <50 NTUs, well development activities may cease. All well development observations and measurements will be recorded on a well development log. A copy of a typical well development log is included as Attachment 1-2.

All drums will be labeled on the side of the drum and stored on-site until proper disposal can be determined. SOP 4 discusses the proper procedures for handling, labeling, and storing Investigation-Derived Waste (IDW). All water purged during development will be contained in 55-gallon steel drums and maintained on-site pending laboratory analytical results from project sampling activities. A temporary drum storage log will be maintained and will record the drum number, date, contents, location stored, and geologist/ engineer.

9. At the completion of drilling operations and well development, a land surveyor licensed in the State of Louisiana will determine the vertical (in reference to msl) and horizontal position of each well. The top north side of each well casing will be notched or permanently marked to indicate a reference point from which the water level measurements will be made. This marked location will be the well survey point. The elevation on the top of each well casing will be determined to an accuracy of  $\pm 0.01$  feet. Horizontal control will be provided to  $\pm 1.0$  feet.

**SOP ONE****Monitoring Well Installation**

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**1.4 MINIMUM REQUIREMENTS****1.4.1 Mobilization and Demobilization**

This should include all activities incidental to equipment set-up and removal. It should include the furnishing of personnel, machinery, tools, and all other equipment necessary to perform and complete the work properly. This item will also include the activities by the Driller with respect to time spent in obtaining and transporting any of the equipment and supplies required for the project to the site and from the site. The Driller should leave the site as found.

**1.4.2 Decontamination**

Prior to mobilization, the drill rig will be thoroughly cleaned to remove all oil, grease, mud, tar, etc. In addition, any down-hole equipment which contains accumulations of heavy or flaky rust, dried drilling mud from previous sites, and/or paint, will be cleaned by sandblasting before being brought to the site. Standard decontamination procedures may not readily remove these materials.

Before drilling each borehole, all down-hole drilling equipment (e.g., augers, drill bits, drill rods, etc.); well screens, well casings, well plugs, etc.; and sampling equipment (e.g., Shelby tubes, split spoon samplers, etc.) will be decontaminated. The decontamination procedure will consist of the following steps:

- Steam clean all down-hole equipment thoroughly with potable water within a lined and bermed area which will retain the decontamination fluids;
- Wash sampling equipment thoroughly with potable water and Liquinox/or equivalent;
- Rinse sampling equipment with deionized/distilled water;
- Rinse with pesticide grade isopropanol (optional); and
- Allow to air dry and wrap completely with aluminum foil if not immediately reused to prevent contamination during storage or transportation to the field.

## **SOP ONE**

## **Monitoring Well Installation**

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If the drilling equipment comes into contact with oil, grease, or other hard-to-remove materials, it may be necessary to rinse the equipment with pesticide-grade acetone or hexane to remove the materials before proceeding to the first decontamination step.

### **1.4.3 Monitoring Well Installation**

Each well will be constructed of 2-inch diameter (minimum) Schedule 40 PVC casing and 0.010 slotted screen.

The wells will be constructed of flush threaded casing and screen, a one-foot sump, and centralizers (if required).

*Sand Filter Pack* - will be 95% siliceous material graded and sieved as appropriate for the natural formation.

*Bentonite Seal* - Bentonite material will consist of granular, chip, or pellet form.

*Well Material* - will consist of 2" PVC casing and screen.

*Surface Completion* - 3-foot by 3-foot by 4-inch thick concrete pad, 6-inch upright protective casing, four 3-inch protective posts set 3 feet above and 2 feet below ground in concrete and not within the pad. Flush-mount pads may be installed in areas of high traffic. The surface of all pads shall be sloped to drain away from the well.

### **1.4.4 Soil Boring, Plugging and Abandonment**

This will include all activities required for the proper plugging and abandonment of soil borings. Borehole abandonment will require grouting by the tremie method (93-96 percent Portland cement and 4 to 7 percent bentonite) to begin at the bottom of the boring and proceed to land surface. The patch at the land surface will be the same material surrounding the borehole (i.e., asphalt, concrete, etc.).

## **1.5 COMMENTS**

The monitoring well installation program may change as field conditions dictate. Field conditions which effect the well installation program may include:

- Location of subsurface obstructions;

**SOP ONE****Monitoring Well Installation**

---

- Hydrogeological conditions; and
- Detection of contaminants.

These conditions may change the number of wells, well locations, screened intervals, and/or materials of construction. Changes to the monitoring well installation must be approved prior to implementation.

## **SOP ONE**

## **Monitoring Well Installation**

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### **ATTACHMENT 1-1**

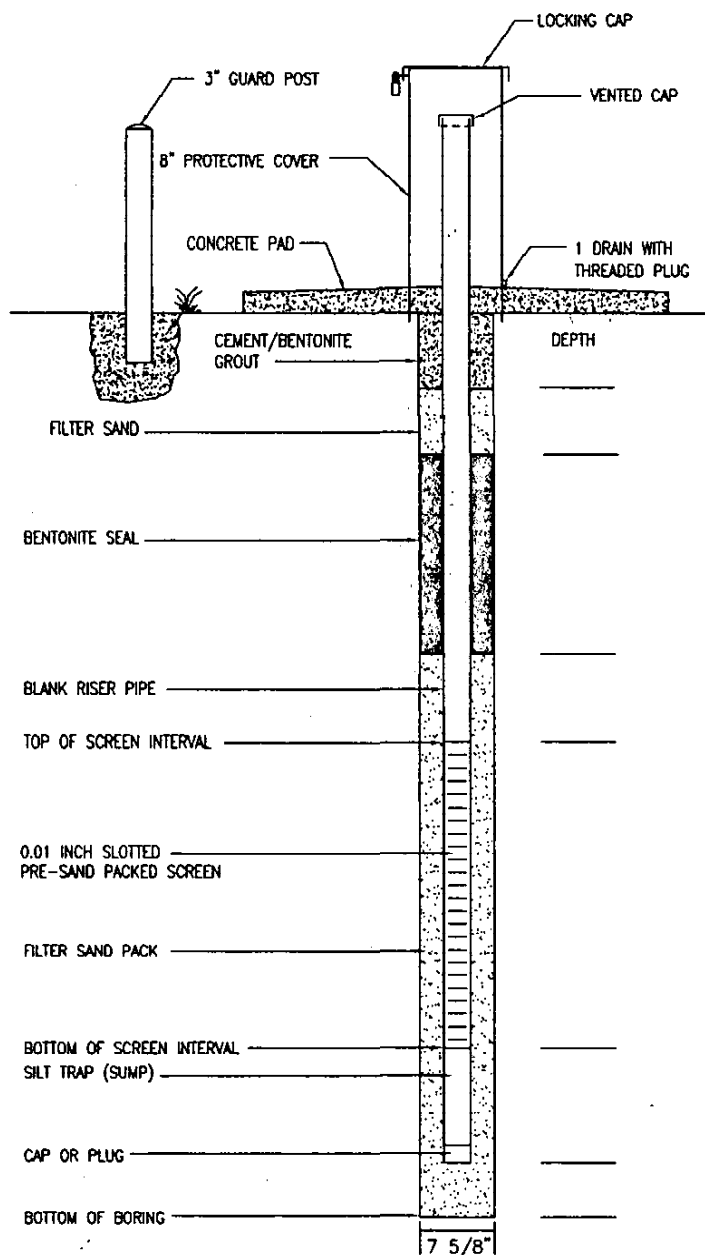
### **MONITORING WELL CONSTRUCTION DIAGRAM**





# Monitoring Well Construction Diagram

Well No.: \_\_\_\_\_ Site: \_\_\_\_\_  
 Project No.: \_\_\_\_\_ Geologist: \_\_\_\_\_  
 Project Name: \_\_\_\_\_ Drilling Contractor: \_\_\_\_\_  
 Start Date: \_\_\_\_\_ Top of Casing Elevation (MSL): \_\_\_\_\_  
 End Date: \_\_\_\_\_ Elevation of Groundwater in Well (MSL): \_\_\_\_\_  
 Well Coordinates: \_\_\_\_\_



## SURFACE COMPLETION

## PROTECTIVE CASING

Material/Type \_\_\_\_\_  
 Outside Diameter \_\_\_\_\_

## RISER PIPE

Type \_\_\_\_\_  
 Inside Diameter \_\_\_\_\_ Vented Cap ( Y / N )  
 Total Length (Top of Casing-Top of Screen) \_\_\_\_\_

## GROUT

Composition & Proportions \_\_\_\_\_

Tremied ( Y / N )

Date \_\_\_\_\_

## CENTRALIZERS ( Y / N )

Depth(s) \_\_\_\_\_ Type \_\_\_\_\_

## BENTONITE SEAL

Chips or Pellets \_\_\_\_\_  
 Setup/Hydration Time \_\_\_\_\_ Tremied ( Y / N )  
 Interval Below Ground Surface \_\_\_\_\_

## SECONDARY FILTER PACK (optional)

Type \_\_\_\_\_  
 Amount Used \_\_\_\_\_ Tremied ( Y / N )

## PRIMARY FILTER PACK

Type \_\_\_\_\_  
 Amount Used \_\_\_\_\_ Tremied ( Y / N )

## SCREEN

Type \_\_\_\_\_  
 Inside Diameter \_\_\_\_\_ Flush Threaded Joint ( Y / N )  
 Slot Size & Type \_\_\_\_\_  
 Interval Below Ground Surface \_\_\_\_\_

## SUMP ( Y / N )

Length \_\_\_\_\_  
 Bottom Cap ( Y / N )

## BACKFILL PLUG

Material \_\_\_\_\_  
 Setup/Hydration Time \_\_\_\_\_ Tremied ( Y / N )

## **SOP ONE**

## **Monitoring Well Installation**

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### **ATTACHMENT 1-2**

### **MONITORING WELL DEVELOPMENT LOG**

**SOP ONE****Monitoring Well Installation**

**Attachment 1-2**  
**Groundwater Development Log**

**PROJECT:****CLIENT:**

Well ID: \_\_\_\_\_ Location: \_\_\_\_\_  
 Date: \_\_\_\_\_ Weather: \_\_\_\_\_  
 Time: \_\_\_\_\_ Samplers: \_\_\_\_\_

**FIELD MEASUREMENTS**

Water Depth From T.O.C. (feet): \_\_\_\_\_ Well Diameter (inches): \_\_\_\_\_

Well Depth From T.O.C. (feet): \_\_\_\_\_ Well Volume (gallons): \_\_\_\_\_

Well Volume Calculations:

$$\text{Vol} = \frac{\pi (R^2 - r^2) L \times 7.48 \text{ gal}}{1 \text{ ft}^3} (0.30) + \frac{\pi r^2 h \times 7.48 \text{ gal}}{1 \text{ ft}^3}$$

R = radius of borehole (feet)

r = radius of well casing (feet)

h = height of the wetted column (feet)

L = length of saturated sandpack (feet)

Total Volume Purged: \_\_\_\_\_ gallons

Purge Method: \_\_\_\_\_

Time	Volume	Water Quality			Turbidity (NTU)
		Temperature °C	pH	Spec. Cond. µmhos/cm	

Observations: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Disposal: \_\_\_\_\_

\_\_\_\_\_

**SOP TWO****Staking, Utility Clearance, and Permitting**

---

**2.1 OBJECTIVE**

To ensure the health and safety of field sampling personnel and prevent damage to underground utilities during soil sampling, precautions must be taken to properly locate subsurface hazards such as gas lines, high-voltage electrical lines, water mains, communication lines, sewer lines, and so forth.

Before any intrusive work can begin, sampling locations at each site must be cleared and a proper digging permit must be obtained.

**2.2 EQUIPMENT AND MATERIALS**

- Untreated wooden stakes, lathes, hubs, surveyor flags, and/or spray paint;
- Small sledge-type hammer;
- Large crowbar or hooks;
- Permanent marker; and
- Site maps.

**2.3 METHODOLOGY**

1. Conduct a safety meeting at the beginning of the day, at each shift change or at a new work site. If new or different personnel arrive on-site, inform them of the potential hazards and have them sign the tailgate safety meeting form.
2. Begin the site clearance procedure by locating and marking all soil boring locations at each site, using the following guidelines:
  - If possible, procure ahead of time utility maps so that the preliminary positioning of sample locations will avoid underground obstructions;
  - Visually scan each sample location to be sure that there are no obvious underground/aboveground lines or obstructions and there is sufficient space for vehicles and equipment;
  - Locate the position of all inlet, outlet, and vent pipes for any underground storage such as Underground Storage Tanks (USTs), where possible;

**SOPTWO****Staking, Utility Clearance, and Permitting**

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- Pound the flag and the hub/stake firmly into the ground, making sure that it is clearly marked with the site number and the borehole number; and
  - Use of spray paint to mark sampling locations should be limited to areas, such as concrete or asphalt, where other markers cannot be installed. Spray paint should not be used around monitoring wells, piezometers, surface soil sample locations, and/or surface water locations.
3. To obtain utility clearances, an ANGUS onsite representative will clear all sampling locations.

During the site tours, have the utility locators/coaches mark utility locations with flags and/or spray paint. If possible, obtain clearance of optional/additional sites in case the original location must be moved. (For certain utilities, this may not be possible; if not, inquire about the procedure necessary to gain additional clearances and time required between notification and arrival of personnel on-site). If obstructions exist or if a borehole must be moved to avoid utilities, it should be relocated to a position that satisfies the intent of the original location.

4. Probe each drilling location to a depth of 5 ft below ground surface (bgs) before drilling begins.

**2.4 COMMENTS**

1. Proper preparation in the initial location and staking is critical for expediting the sampling process.

## **SOP THREE**

## **Sampling Equipment Decontamination**

---

### **3.1 OBJECTIVE**

Decontamination of soil boring equipment, sampling equipment, and any other item which may have come in contact with potentially contaminated material is performed as a QA measure and safety precaution. Decontamination helps prevent cross-contamination among samples and helps maintain a clean working environment for the safety of field personnel. The methodology for decontamination was prepared in accordance with the following documents:

EPA, 1996, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (SOPQAM)*, U. S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

NIOSH, OSHA, USCG, and EPA, 1985, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Prepared by the National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and EPA. U. S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH Report, October 1985. Washington, D.C.: U. S. Government Printing Office.

### **3.2 EQUIPMENT AND MATERIALS**

- Soap: Liquinox, or equivalent;
- Potable water;
- Reagent-grade water;
- Pesticide-grade isopropanol;
- Cleaning brushes;
- Cleaning containers: plastic bucket and pans;
- A high-pressure, hot water/steam cleaner; and
- Health and safety equipment as specified in the HASP.

### **3.3 METHODOLOGY**

Small, reusable equipment, including drilling and sampling equipment, is mainly decontaminated by high-pressure steam cleaning or rinsing with liquids that include soap or detergent solutions, potable water, deionized water, or solvents. Following decontamination,

**SOP THREE****Sampling Equipment Decontamination**

---

if the equipment is not to be reused immediately, it will be stored by wrapping it in aluminum foil or visqueen, and appropriately rinsed before the next use.

**3.4 PRE-SAMPLING DECONTAMINATION ACTIVITIES**

1. Wear the appropriate PPE, as specified in the HASP and as required for the specific work area.
2. Assemble containers and equipment for decontamination, designing the decontamination station in such a manner as to prevent liquids from spilling onto the ground.
3. Decontaminate all new equipment or equipment not previously decontaminated before use.
4. If the protective wrapping on a piece of precleaned equipment has been torn, or if there is any question about its cleanliness, the equipment should be considered contaminated and undergo the full decontamination procedures before it is used.

**3.5 DECONTAMINATING SAMPLING EQUIPMENT**

1. Remove any solid particles from the equipment or material by high-pressure steam cleaning or brushing and rinsing with available potable water. This will remove gross contamination.
2. Wash sampling equipment with a brush and a phosphate-free detergent solution (Liquinox or similar laboratory detergent and potable water).
3. Rinse equipment thoroughly with potable water.
4. Double-rinse the equipment with reagent-grade or deionized water.
5. For organic contaminants, an optional rinse with pesticide-grade isopropanol may be necessary to dissolve and remove coatings of organic contaminants.

## **SOP THREE**

## **Sampling Equipment Decontamination**

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6. Allow equipment to air dry. If there is not enough time to air dry completely, the equipment should be rinsed with copious amounts of reagent water. Equipment may then be used immediately.
7. Unless the equipment is going to be used immediately, it must be wrapped in new aluminum foil, shiny side out, to keep it clean until needed. For large bulky equipment, new visqueen can be substituted for the aluminum foil.

### **3.6 DECONTAMINATION OF LARGE EQUIPMENT**

Drilling equipment (rigs, drill rods, samplers, etc.) and other large pieces of field equipment which cannot be decontaminated using the method described above, must be high-pressure steam cleaned before and after each use.

Steam cleaning will be performed at an appropriate central decontamination area specified by ANGUS. The decontamination area must be capable of containing decontamination fluids and allow for managing of investigation-derived wastes (IDW).

### **3.7 COMMENTS**

1. Any field equipment not used during a field activity must be decontaminated before its return to the equipment stock for reuse at another site.
2. At each phase of the decontamination process, decontamination fluids and rinsates should be collected and managed as outlined in SOP 3. Decontamination fluid samples will be collected for waste characterization analyses.
3. Isopropanol rinse should be omitted for any equipment such as plastic bailers or well-sounding tapes.
4. Solvents should not be used on any type of non-Teflon<sup>®</sup> plastic equipment that will contact an environmental sample or be introduced into a boring or piezometer.
5. All decontamination fluids will be placed in 55-gallon drums and handled as specified in SOP 4 Field Management of Investigation-Derived Wastes.



## **SOPFOUR**

## **Field Management of Investigation-Derived Waste (IDW)**

---

### **4.1 OBJECTIVE**

To collect and manage IDW in accordance with state and federal regulations, this SOP provides easy-to-follow procedures for characterizing, handling, storing, and disposing of IDW generated during the field program. IDW management techniques emphasize waste minimization.

### **4.2 EQUIPMENT AND MATERIALS**

- DOT-approved drums and containers;
- IDW "Analysis Pending" labels (optional);
- "Potentially Hazardous Waste" labels (optional);
- Indelible marker (i.e., Sharpie) or paint markers;
- Clear adhesive tape;
- Hammer, ratchet, socket, and crescent wrench for opening/closing drums;
- PPE;
- Plastic buckets for carrying purge water to drums;
- Absorbent pads and/or booms for cleaning up spills; and
- Drum Storage Log (Attachment A9-1).

### **4.3 METHODOLOGY**

#### **4.3.1 Soil and Water IDW**

1. Conduct a safety meeting at the beginning of the day, at each shift change or at a new work site. If new or different personnel arrive on-site, inform them of the potential hazards and have them sign the tailgate safety meeting form.
2. Excess soils will be placed in DOT-approved drums or containers separate from drums containing only purge and decontamination water. PPE will be placed in DOT-approved drums or containers separate from drums containing soils and drums containing purged and decontaminated water. The Field Manager and appropriate Facility personnel will identify drum management and temporary storage areas.

**SOPFOUR****Field Management of Investigation-Derived Waste (IDW)**

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3. Site personnel will carefully monitor materials placed into individual drums or containers and confirm proper labeling and documentation on the Drum Storage Log (Attachment 14-1).
4. Place excess soil (and any excess water sample) in appropriately sized DOT-approved drums or cans. Place the lid and gasket on the drums or cans and secure the lid and/or bungs when not in active use.
5. Completely clean the outside of the drums.
6. Place an adhesive label on the side of the container. Using an indelible marker, write the following information on the label or use a paint marker and write directly on the containers:
  - "Facility";
  - Source Unit (e.g. West Plant French drain)
  - The phrase "Analysis Pending";
  - Accumulations start date;
  - Contents and location (e.g., soil, PPE); and
  - Drum or container number. This number is arbitrary and is used in tracking the total number of drums at the site and where they are temporarily being stored (Attachment 4-1).
7. Drums used at each site will temporarily be stored at the facility pending laboratory analysis.
8. Document all drum filling, movements, and staging using the Drum Storage Log (Attachment 4-1).

**4.3.2 PPE and Disposable Sampling Equipment Waste**

1. Remove excess solid and liquid waste from PPE and disposable sampling equipment.
2. Place all PPE and sampling equipment to be disposed in sealed 55-gallon drums. Disposal alternatives will be evaluated pending analytical results for each individual site.

## **SOP FOUR**      **Field Management of Investigation-Derived Waste (IDW)**

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### **4.4 COMMENTS**

1. Be sure each container is labeled and managed in accordance with the Methodology section of this SOP.
2. Be sure to complete the Drum Storage Log form (Attachment 4-1) at the end of each sampling event.

## **SOPFOUR**

## **Field Management of Investigation-Derived Waste (IDW)**

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### **ATTACHMENT 4-1**

### **DRUM STORAGE LOG**



## **SOPFIVE**

## **Location Surveying**

---

### **5.1 OBJECTIVE**

A State of Louisiana registered land surveyor will survey the location of every sampling point. This will provide a permanent record of sampling locations and information that can be used in future reports and potential corrective measures designed for the site.

### **5.2 EQUIPMENT AND MATERIALS**

The surveying subcontractor will supply all equipment and materials that will be used during the surveying activity.

### **5.3 METHODOLOGY**

The surveying subcontractor may use either traditional survey techniques or a global positioning system (GPS) to satisfy the following survey requirements:

1. Horizontal coordinates of each sampling location must be measured to an accuracy of  $\pm 1$  foot in reference to the State Plane Coordinate System.
2. Ground surface elevations of each piezometer location will be measured to the nearest 0.1 foot. The top of casing (north side) of the piezometers will be identified with a mark (chiseled, hole, etc.) and this mark will be measured to the nearest 0.01 foot, relative to mean sea level or the National Geodetic Vertical Datum of 1983. (If the 1983 datum is not available, references may be made to the 1929 Datum, but should be so noted).
3. To aid in accurate reconstruction of site figures and future plans of the site, one permanent reference point will also be surveyed. This point should be the nearest building corner to the site or a suitable alternative reference point.

### **5.4 COMMENTS**

1. Do not mobilize the surveying contractor until it is certain that there will not be additional borings or piezometers at a site.
2. All sample locations will be staked and identified on a site map that will be provided to the surveyor.

# **SOPSIX**

## **Geologic Description and Logging**

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### **6.1 OBJECTIVE**

Geologic logging may be performed to define the subsurface geology. All soils will be described using the Unified Soils Classification System (USCS) (ASTM Designation D2488-84: Standard Practice for Description and Identification of Soils [Visual Manual Procedure]).

### **6.2 EQUIPMENT AND MATERIALS**

- Tape measure;
- Munsell soil color chart (optional);
- Hand lens;
- Stainless steel knife or spatula;
- Pocket penetrometer;
- Dropper with 10% HCl for calcium carbonate test;
- Sampling table;
- Potable water;
- Borehole log forms (Attachment 7-1);
- Health and safety equipment, as specified in the HASP; and
- Work plan and HASP.

### **6.3 METHODOLOGY**

1. Follow instructions in the HASP.
2. Conduct a safety meeting and complete a STAC Card at the beginning of the day, at each shift change or at a new work site. If new or different personnel arrive on-site, inform them of the potential hazards and have them sign the tailgate safety meeting form.
3. Note pertinent information on the boring log.
4. Note unusual drilling conditions and comments in "remarks" section of logging form (e.g., "easy penetration", "hammering required", etc.).
5. Measure the entire sample length and record recovery (as total footage recovered over total length that the sampler was pushed) to the nearest tenth of

**SOPSIX****Geologic Description and Logging**

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a foot. Mark stratigraphic changes on the logging form. Sample recovery does not include slough at the top of the sample.

6. Separate a small, representative portion of each distinct soil or at least every two feet and place in a zipper-style plastic bag or glass jar, seal, and label for subsequent headspace analysis with flame- or photo-ionization detector (FID/PID).
7. Slice the soil core perpendicular to length, test the soil core with a pocket penetrometer, and record the result on the boring log (for cohesive soils only).
8. Identify the soil type in accordance with the USCS.
9. Record soil descriptions on the borehole log form. To facilitate the comparison of logs, all descriptions should use the following order and style:
  - Formation (if named and known);
  - Soil type, including secondary components (Silty Sand with Clay:);
  - USCS Code (sm)
  - Soil color (Yellow-brown);
  - Consistency for cohesive soils, density for non-cohesive soils;
  - Plasticity (non-plastic, low, medium and high);
  - Texture/fabric/bedding;
  - Internal structures, if any;
  - Miscellaneous descriptors (roots, nodules, odors, particle angularity);
  - Sorting and grain size for sands and silts; and
  - Relative moisture content (dry, moist, wet).
10. Note all visible contamination, PID/FID measurements, odor, or any observed evidence of contamination in the sample.
11. Record all other pertinent information on the boring log.
12. Collect a 6-inch interval for each 2-foot interval and place half of the sample in a sample jar (placed on ice) and put the other half of the sample into a container for measuring soil vapor headspace.



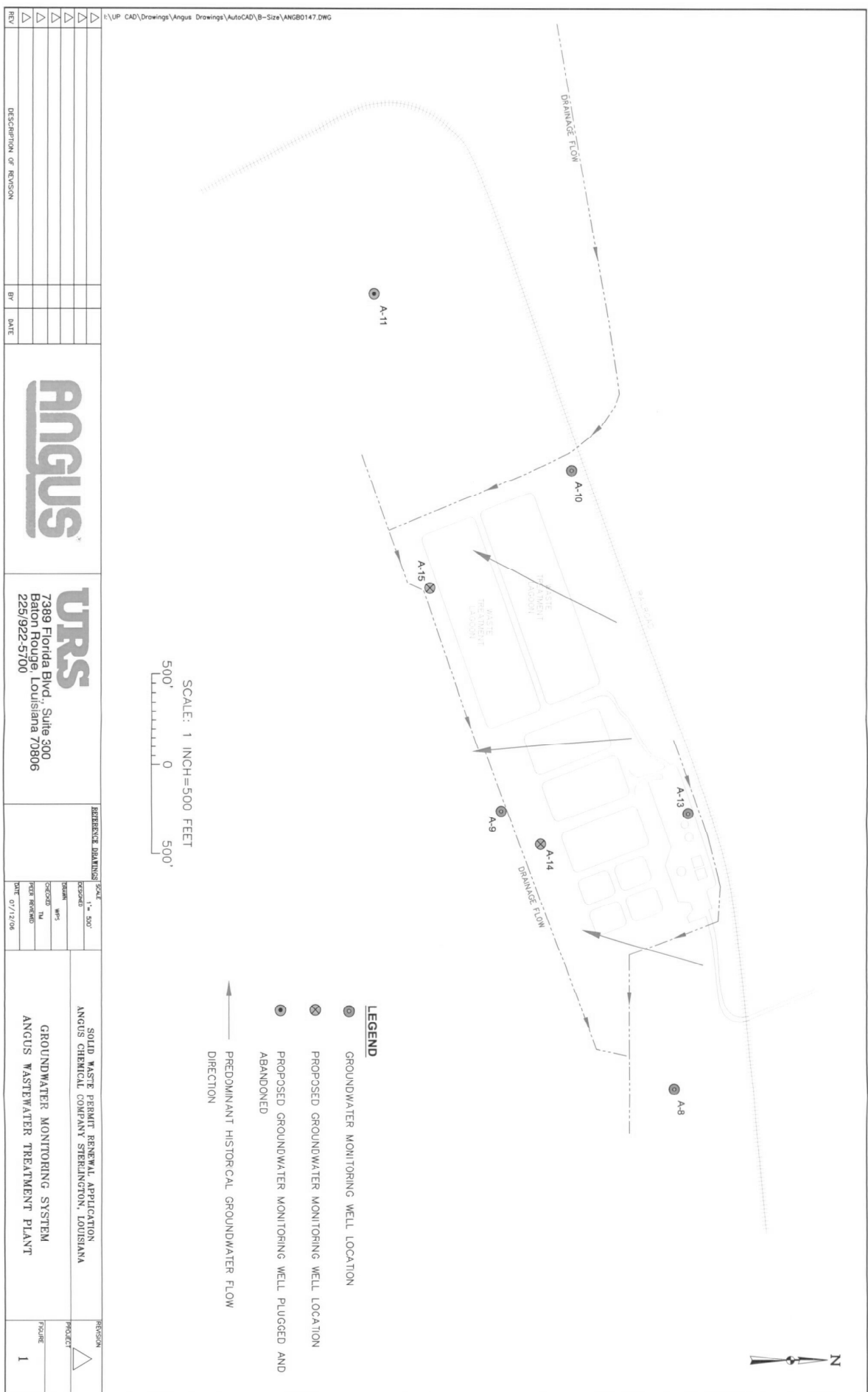
**SOPSIX****Geologic Description and Logging**

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13. After a minimum of 20 minutes, the soil sample headspace will be tested in the field with a PID/FID and the results recorded on the boring log.

**6.4 COMMENTS**

- Obtaining a good sample for chemical analysis is the first priority; collect chemical samples for volatile organic compounds (VOCs) before logging the soil core.
- Because visible contamination and field screening by FID/PID is used to provide preliminary information of the extent of contamination, it is essential that pertinent observations and readings are recorded on the logging form.
- Consistent logging is important for accurate characterization of site geology. Although the geologist may need to use his/her professional judgment to infer the contacts and stratigraphy, using the ASTM methods will provide consistent results.



## **SECTION FOUR**

### **Part III Standard Permit Application Additional Supplementary Information**

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#### **4.1 ADVERSE ENVIRONMENTAL EFFECTS**

##### **5.23 A**

ANGUS believes that potential environment effects related to operation of the facility were minimized by the facility design. In addition, ANGUS believes that the wastewater treatment plant is operated in a manner that minimizes the effects of the facility on the environment of the surrounding area.

The threat of contamination of groundwater is a potential adverse environmental effect. Several steps were taken to address the potential for groundwater problems. The design of the twenty foot deep treatment basins is such that they are essentially built from the ground up, rather than below the land surface, because of the relatively shallow ground water table in Ouachita Parish. The bottoms of the basins were excavated to a depth of three feet and then backfilled with low permeability recompacted clay. In addition, the geology of the site indicated that the basins are built on a naturally occurring twenty to thirty foot layer of clayey soil that serves to limit water infiltration and migration. Lastly, the site monitoring wells would detect groundwater contamination, should it occur, if it migrated off of ANGUS property.

Effects of air pollution have been minimized by the location of the site and the nature of the operations. Because of the nature of biological treatment, significant emissions of criteria pollutants are unlikely. However, all large bodies of water, including wastewater treatment ponds, usually emit characteristic odors. Since this is unavoidable to a certain extent, a buffer zone has been provided between the facility and the nearest residential areas.

Since the facility is a wastewater treatment plant, the facility obviously is protective of surface water by elimination of contaminants from the discharge. The wastewater treatment plant produces an extremely stable effluent with a low biochemical oxygen demand.

A border of trees was left surrounding the site on three sides (the fourth side is bordered by land used primarily for agricultural purposes) in order to reduce the potential noise emanating from the site and to improve the aesthetic appearance of the site. The facility is completely fenced to provide adequate security and to eliminate any hazards to people or animals that might otherwise wander onto the site.

Adverse environmental effects resulting from the construction and operation of the wastewater treatment facility have been avoided to the maximum extent possible.

**SECTION FOUR****Part III Standard Permit Application  
Additional Supplementary Information**

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**4.2 COST-BENEFIT ANALYSIS****523.B.**

A cost-benefit analysis of the environmental impact of the facility balanced against the social and economic benefits of the facility clearly and unequivocally demonstrates that the social, economic, and environmental benefits of the facility outweigh the environmental costs.

The wastewater treatment facility treats the wastewater produced from the operations of the Nitroparaffins production plant at Sterlington. Since there are no other technically or economically feasible methods of disposal, continued operation of the Nitroparaffins production plant is contingent upon operation of the wastewater treatment plant. ANGUS employs over 150 people at the Sterlington Plant. Its payroll and purchases of raw materials constitute a multimillion dollar part of the area economy. Clearly there are net social and economic benefits from continued operation of the wastewater treatment plant.

The existing wastewater treatment plant replaced an older wastewater treatment plant that was not capable of treating the water to the standards required by today's environmental regulations. The purpose of the wastewater treatment plant is to create a wastewater that is environmentally acceptable for discharge.

ANGUS does not believe that there are significant environmental costs associated with continued operation of the facility. A minor loss of woodland habitat that occurred when the land was cleared was clearly offset by the improved habitat provided for some animals that benefit from the presence of the fresh-water hold-and-release basins.

In summary, ANGUS firmly believes that the minor environmental costs associated with the existence of the facility are extremely outweighed by the benefits of its continued operation.

**4.3 DESCRIPTION OF POSSIBLE ALTERNATIVE PROJECTS****523.C.**

The wastewater treatment facility was built under the ownership and direction of International Minerals and Chemicals (IMC). Before construction of the facility, IMC considered several other projects for reducing the Sterlington Plant discharges to the Ouachita River. All other alternatives were rejected because they were not as effective as biological treatment.

## SECTION FOUR

### Part III Standard Permit Application Additional Supplementary Information

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The first alternative considered was reduction of the wastewater produced by the plant by modifying the production processes to either eliminate the wastewater, recycle the wastewater, or reduce the amount of wastewater. Several million dollars were spent on various projects to reduce the amount of wastewater produced. Although these projects were successful in reducing the load to the wastewater treatment plant in existence at the time, this plant was still unable to produce the required amount of acceptable-quality effluent to meet the requirements of the NPDES wastewater discharge permit.

The next alternative was treating the waste at the main plant site by modifying the previously existing wastewater treatment plant. After several years extensive pilot and bench scale testing, it was determined that there was not enough room on site to build the long-detention-time system that the experimental work had indicated was necessary to get maximum biological treatment.

Treatment processes other than biological treatment were considered, but none were considered to be technically and economically feasible, and some were simply not effective in treating the wastewater. For example, adsorption on activated carbon was considered, but bench scale tests indicated that the low- molecular-weight organics that make up the dominant portion of the organics in the wastewater were not readily adsorbed on carbon, and that carbon adsorption was therefore not effective in treating the wastewater.

ANGUS believes that there are no other alternative projects which could offer more protection to the environment without unduly curtailing non- environmental benefits more fully delineated in the section 523.B response above.

#### 4.4 POSSIBLE ALTERNATIVE SITES

##### 523.D.

IMC considered other sites before selecting the present site of the existing wastewater treatment plant. The present site was chosen because of its availability , accessibility, and suitability. ANGUS concurs with the decision made by IMC in selecting the site.

The first choice was to build the wastewater treatment plant at the Sterlington Plant site. This had many advantages stemming from the ability to use already existing services and utilities, as well as the obvious economic and operational advantage of not having to operate a remote site. However, the experimental work done to size the system indicated that a long-detention-time system, requiring more land area than was available within the boundaries of the Sterlington Plant, would be necessary.

## **SECTION FOUR**

### **Part III Standard Permit Application Additional Supplementary Information**

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The next logical choice was land near or adjacent to the Sterlington Plant. A site of over 400 acres immediately south of the plant was located and purchased. Most of the land purchased was wetlands, but it was believed that there was enough high ground to locate the wastewater treatment plant. However, soil borings performed on the site indicated that there was not enough ground with suitable load bearing capabilities to support the levee structures planned outside the wetlands area.

The third choice was on a tract of land approximately three miles from the main plant that IMC already owned. There was adequate suitable ground available that was not wetlands. The fact that IMC already owned the land expedited the construction schedule considerably. In addition, any alternate site would have had to be wetlands or farmland. There were several environmental advantages to the site, such as the relatively low population density in the area, the size of the site which allowed buffer zones around the facility, and the clayey nature of the soil in the area. No significant environmental problems were known to be associated with the site, and certainly none that would not have been common to any site that would have been chosen in the area.

ANGUS believes that there are no other alternate sites that would offer more protection to the environment than the existing facility site without unduly curtailing non-environmental benefits.

#### **4.5 DESCRIPTION OF THE MITIGATING MEASURES**

##### **523.E.**

ANGUS believes that it is operating the existing wastewater treatment plant in a way that minimizes its effects on the environment. The things that have been and are currently being done to minimize the effects of the operation on the environment, are included in the sections 523.A and 523.B responses above.

ANGUS is not aware of any additional mitigating measures which would offer more protection to the environment than the facility, as it is presently operated, without unduly curtailing non-environmental benefits.

## **SECTION FOUR**

### **Part III Standard Permit Application Additional Supplementary Information**

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#### **TABLES FOR SECTION 4**

None

## **SECTION FOUR**

### **Part III Standard Permit Application Additional Supplementary Information**

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#### **FIGURES FOR SECTION 4**

None



## **SECTION FOUR**

### **Part III Standard Permit Application Additional Supplementary Information**

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#### **ATTACHMENTS FOR SECTION 4**

None